

The Economic Costs of Drug and Alcohol Abuse in Washington State, 1990

Prepared for

**Division of Alcohol and Substance Abuse,
Department of Social and Health Services,
Olympia, WA**

January, 1993

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EXECUTIVE SUMMARY

Background and Purpose

Drug and alcohol abuse are major causes of widespread illness, disability, and premature death. The burden on society of these disorders encompasses the use of costly medical resources, significant losses of productivity, serious motor vehicle accidents, fire destruction, and criminal activity resulting in property destruction and incarceration. The purpose of this study was to estimate, as precisely as possible, the economic costs of drug and alcohol abuse for Washington for 1990. Costs within seven areas were analyzed: treatment, morbidity, mortality, medical care, crime, other specific diseases, and other related costs.

The study was sponsored by the Washington State Department of Social and Health Services, Division of Alcohol and Substance Abuse. It was conducted over a three-month period beginning in October 1992.

Methodology

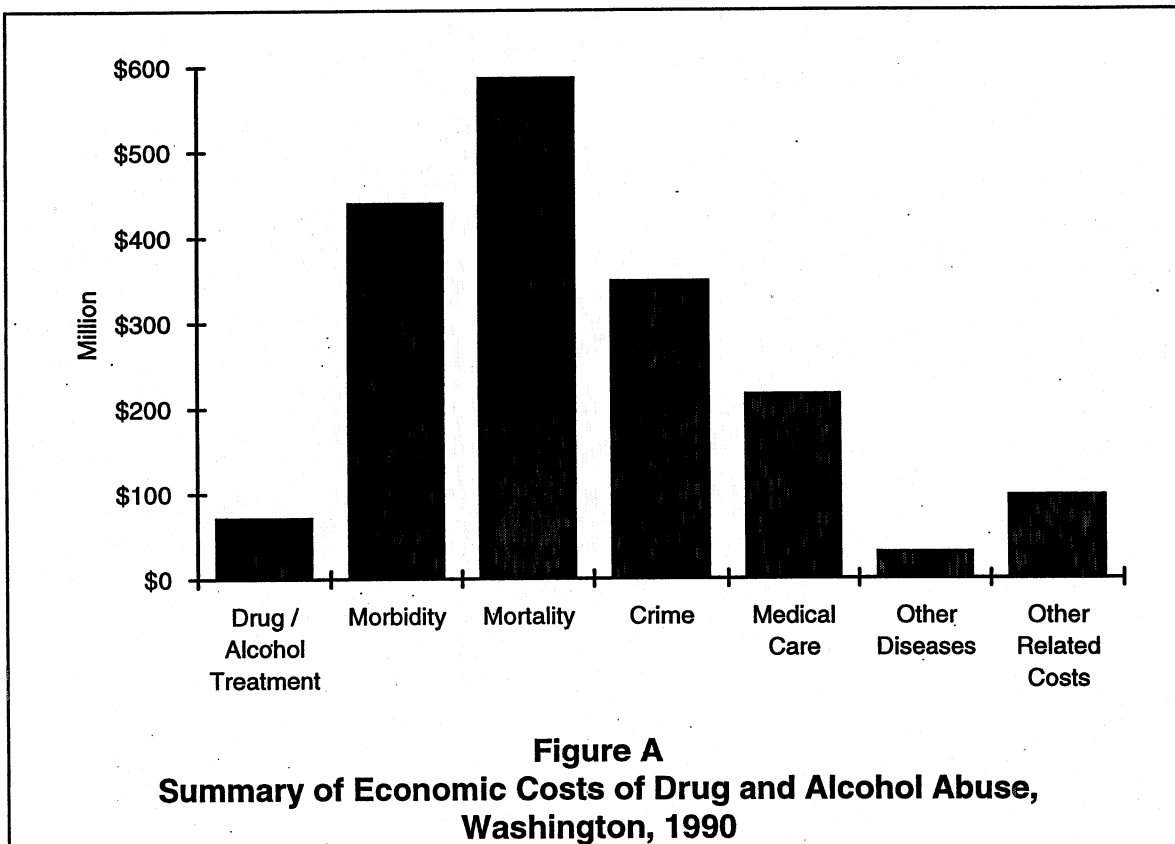
This study builds directly on two previous cost studies, a national study conducted by Rice et al. (1990) and a Texas study conducted by Liu (1992). This study, like the previous two, employed prevalence-based, cost-of-illness assessment methodologies that used the human capital approach to value life and estimate productivity losses. Studies using the human capital approach estimate direct and indirect costs of specific categories of illness. Direct costs are those for which payments are made (e.g., medical care or substance abuse treatment); indirect costs are those for which resources are lost (e.g., lost productivity due to morbidity).

A number of the analyses described in the report are based on one or more assumptions. In general, we sought to be restrictive in our assumptions in order to generate cost estimates that would be conservative. Had we been less restrictive, our cost estimates would certainly have been higher.

A considerable amount of information was gathered for this study. Though we tried to obtain statewide data, this was not always possible. For some of our estimates, we had to rely on national data, which were extrapolated to Washington. This inevitably increases error; therefore, cost estimates based on extrapolation should be interpreted cautiously.

Findings

Total economic costs of drug and alcohol abuse for Washington in 1990 were estimated to be \$1.81 billion. On a per capita basis, this translates to \$382 per non-institutionalized person in the state. The magnitude and distribution of costs among the areas analyzed are shown in Figures A and B below. As shown, mortality accounted for the largest portion of costs, over \$.5 billion, followed by morbidity, crime, and medical care. Drug and alcohol costs could be disaggregated for five of the seven areas analyzed, which accounted for \$1.2 billion in costs. As shown in Figure C, alcohol abuse accounted for over 60% of these costs.



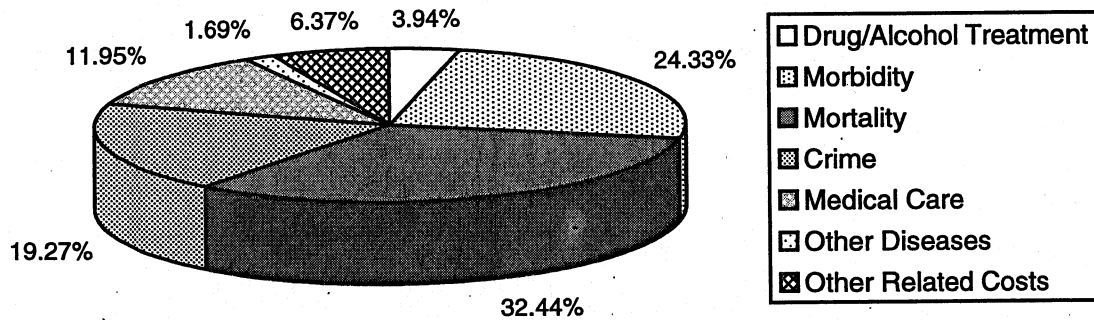


Figure B
Percent Distribution of Drug and Alcohol Abuse Costs,
Washington, 1990

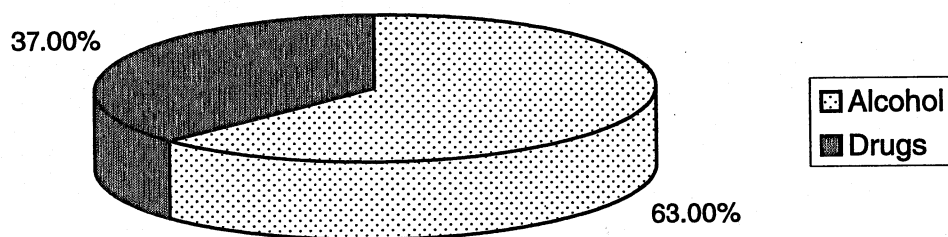


Figure C
Substance Abuse Costs, Alcohol and Other Drugs

In addition to estimating economic losses arising from drug and alcohol abuse, the study generated other findings of interest. Some of the key findings for selected areas were:

Mortality:

- 2,155 deaths occurred in Washington in 1990 caused by or related to drug and alcohol abuse. These deaths resulted in approximately 56,000 years of potential life lost. The leading causes of substance abuse-related deaths were:
 - motor vehicle accidents – 378 deaths
 - cerebrovascular disease – 189 deaths
 - suicide – 188 deaths
 - alcohol cirrhosis – 152 deaths
- The estimated cost per death measured in terms of lost income was \$272,000.

Crime:

- Of the 239 arrests for homicide, 96 were associated with drug or alcohol use/abuse.
- Of 7,663 arrests for felonious assaults, 2,827 were associated with drug or alcohol use/abuse.
- Of 45,867 arrests for larceny-theft, 10,274 were associated with drug or alcohol use/abuse.
- 2,404 person years were served in state prisons or local jails as a result of criminal activity related to drugs or alcohol.

Medical Care:

- Almost 20% of discharges from Washington hospitals were patients with a secondary/tertiary diagnosis related to alcohol or drug abuse.
- Hospitalized patients who had a secondary or tertiary diagnosis related to drug or alcohol abuse incurred costs that were approximately 10% to 30% higher than other patients.

Summary

Drug and alcohol abuse in Washington result in significant economic losses. For 1990, we estimated these economic losses to be \$1.81 billion. The largest losses resulted from premature death and lost productivity. During 1990, 2,155 persons died of causes related to drug and alcohol abuse. According to the Needs Assessment Data Project (a recently completed state-funded project to estimate the need for publicly-funded services) only about 10% of those estimated to be in need of publicly funded treatment services actually received such care (Kohlenberg, Yette, Mack, 1992).

The findings of this study indicate that alcohol abuse, not other drug abuse, has the greatest economic impact. For every \$1 that Washington State collects in tax revenue from alcohol sales, over \$7 is spent as a result of alcohol abuse. The large magnitude of these economic costs suggest a need to consider whether current approaches aimed at addressing drug and alcohol problems in the state are adequate.

CHAPTER 1

INTRODUCTION

1.1 Background and Objectives

The problem of alcohol and drug abuse continues to be a major concern for society affecting people from all social strata. Alcohol and drug abuse are major causes of widespread illness, disability, and premature death in the U.S. The burden on society of these disorders encompasses the use of costly medical resources, significant losses of productivity, serious motor vehicle accidents, fire destruction, and criminal activity resulting in property destruction and incarceration. While it is not possible to quantify in monetary terms all of the consequences of drug and alcohol abuse, it is possible to measure many of these costs.

This report analyzes the economic costs of alcohol and drug abuse in Washington for 1990. The study was sponsored by the Washington State Department of Social and Health Services, Division of Alcohol and Substance Abuse (DASA). Similar economic studies of alcohol and drug abuse were recently conducted for the nation as a whole (Rice et al. 1990) and for Texas (Liu 1992). Both of these studies documented large costs.

It was felt that a similar study in Washington could provide valuable information to better understand the economic impact of drug and alcohol abuse in the state, and thereby improve both the formulation of public policy and the development of programs aimed at addressing the problem. With this in mind, DASA sponsored a study undertaken by Dr. Thomas Wickizer, Associate Professor in the Department of Health Services at the University of Washington. This study was conducted over a three-month period beginning in October, 1992.

1.2 Methodology

The study reported here builds directly on the two reports by Rice et al. (1990) and Liu (1992). The Rice study, which attempted to quantify the costs of drug and alcohol abuse for the nation as a whole, was especially important in providing methodological guidance for the current study. The Liu study provided a useful example of a cost assessment at a state level (Texas).

The current study, as well as the two reports by Rice et al. (1990) and Liu (1992), represent prevalence-based cost-of-illness studies that estimate costs by the human capital method. Prevalence-based costs provide an estimate of the direct and indirect economic burden incurred in a period of time (the base period) as a result of the prevalence of disease (Rice et al. 1990). The base period for this study is 1990. Prevalence-based costs measure the value of resources used or lost during a specified period of time, regardless of the time of disease onset. In estimating the economic burden resulting from the prevalence of disease, the present discounted value of future losses due to mortality are calculated.

Cost-of-illness studies, including this one, usually require the valuation of human life. There are two approaches used: the human capital approach and the willingness-to-pay approach. Following Rice et al. (1990), we used the former, which is the approach used most widely. According to the human capital approach, an individual's value to society is his or her production potential. If markets are functioning well, individuals will be paid a wage equal to the value of the output they produce. Thus, the value of a person to society can be measured by his or her earnings and the value of life would then be the future earnings stream. This stream of earnings is discounted using a discount rate that reflects the trade-off between the values of a dollar today and a dollar tomorrow.

Studies employing the human capital approach estimate the direct and indirect costs of specific categories of illnesses. Direct costs are those for which payments are made (e.g., medical care or alcohol treatment) and indirect costs are those for which resources are lost (e.g., lost productivity due to morbidity or mortality). Estimates of direct costs are usually straightforward; however,

estimation of indirect costs is more involved because it may require valuation of human life.

The human capital approach assumes that wage earnings reflect productivity and the value of an individual to society. This assumption has been forcefully challenged (Jones-Lee 1976; Schelling 1968). Obviously, it undervalues certain members of society: children, elderly, ethnic minorities, and women. It also disregards psychosocial costs such as pain and suffering.

Ideally, one would want a more inclusive measure that could be easily applied to available data and that could make adjustment for race and sex discrimination. Such an approach does not exist. Despite its limitations, the human capital approach does measure an important component of the cost of disease. Morbidity and mortality destroy labor, a valuable economic resource, by causing persons to lose time and effectiveness from work and other productive activities (e.g., housekeeping), forcing them out of the labor force completely, or bringing about premature death. Substance abuse creates an undeniable loss to individuals and society, and it is this loss that this study attempts to measure through the human capital approach.

1.3 Limitations

This study has a number of limitations. First, many of the analyses included in the report are based on one or more assumptions. Our general approach was to be restrictive in our assumptions and to use conservative judgment in developing the cost estimates. Given the inherent uncertainty and complexity of our analytic task, we preferred to adopt this approach. Had we made less restrictive assumptions our cost estimates would have certainly been larger. Second, in estimating costs, we used the attributable fraction values used by Rice et al. (1990). These values provide a method of generating substance abuse-related cost estimates for the different areas analyzed. Many of these values were derived from research that is now somewhat dated. While we believe the attributable fraction values remain valid, our need to rely on them necessarily posed a limitation for this study. Third, though we tried to obtain statewide data, this was not always possible. Hence, some of our estimates rely on national

data, which were extrapolated to Washington. The reader should use caution in interpreting cost estimates based on extrapolation.

1.4 Organization of the Report

This report is organized into nine chapters. Chapter 1 is the introduction. Chapter 2 discusses treatment costs. Chapters 3 and 4 analyze morbidity and mortality costs. Cost estimates for medical care and crime are presented in Chapters 5 and 6. Chapter 7 describes the costs for three specific diseases closely linked to alcohol and drug abuse: FAS, AIDS, and hepatitis-B. Chapter 8 describes several other related costs, e.g., the cost of fire destruction due to alcohol abuse. Chapter 9 summarizes the findings and discusses some of the implications of these findings.

Each chapter contains a methodology section, which discusses the specific procedure used to generate the estimates reported in that chapter. Some chapters also have a technical appendix, which provides more detailed and technical discussion of methods and estimation procedures, that appears at the end of this report.

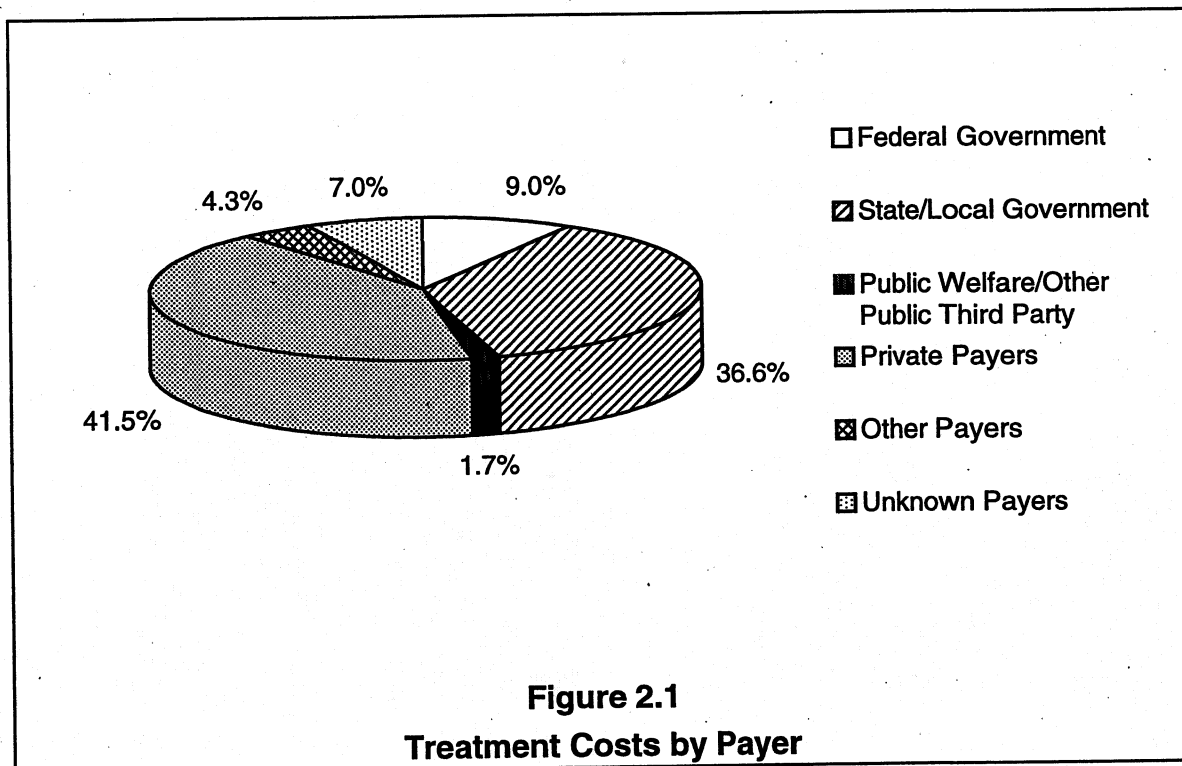
CHAPTER 2

TREATMENT

A range of treatment services are available in Washington to persons with alcohol and drug abuse problems. These services include inpatient residential programs, outpatient programs, methadone maintenance, detoxification, and special youth treatment programs. Funding for treatment comes from various sources, both public and private. Complete and detailed information on treatment costs and funding is difficult to obtain because of the number of treatment programs and the multiple sources of funding. This chapter documents what is known about treatment costs in Washington and provides estimates of these costs for 1990. It does not address the question of the cost effectiveness of treatment.

The major findings of the analysis were:

- An estimated 22,345 clients received treatment for substance abuse problems in Washington at a total estimated cost of \$71.2 million.
- Major sources of funding were: private payers (41.4%), state and local government (35.5%), other public providers (6.1%), and federal government (5.7%) (Figure 2.1).
- 38% of clients were treated for alcohol abuse, 16% were treated for drug abuse, and 47% for dual abuse problems.
- 93.8% of the clients received outpatient treatment, 6.2% were treated as inpatients.
- Clients receiving treatment were predominantly male (68.8%), white (79.2%) and between the ages of 18 and 44 (73.9%).



2.1 Methodology

Estimates of treatment costs are based on the 1991 National Drug and Alcoholism Treatment Unit Survey (NDATUS). NDATUS is the only comprehensive survey of both public and private sector treatment units. The NDATUS is conducted annually in Washington by DASA for the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the National Institute on Drug Abuse (NIDA).

The 1991 survey was used to estimate treatment costs rather than the 1990 survey because of the incompleteness of the latter. Completion of the NDATUS by treatment providers is voluntary; less than half of the providers completed the survey in Washington in 1990, while over 90% completed it in 1991. Admittedly, using 1991 data to estimate 1990 costs will introduce some error into the analysis. However, we believe the completeness of the 1991 survey enhances the reliability of the data and more than compensates for this shortcoming. Based on a review of limited data available for both 1990 and 1991, it appears there was no significant change in the number of treatment units operating in the state or in the total numbers of clients served. Thus, the 1991 NDATUS should

provide adequate estimates of 1990 treatment costs. To adjust for inflation, we deflated the 1991 NDATUS cost figures by 4.7%.

2.2 RESULTS

The sources of treatment funding are shown in Table 2.1. The largest source of funding was private, which includes private donations, client fees, and private third-party payments. Private payments accounted for approximately

Table 2.1
Treatment Funding by Payer, Washington, 1990
(\$ in thousands)

Funding Source	Funding (\$)	Percentage (%)
Public Funding		
Federal government (Includes Medicare payments and ADMS block grant funding)	6,394	9.0
State government (Includes Medicaid payments)	14,439	20.4
Local government	3,996	5.6
State/local fee	7,542	10.6
Public welfare	1,129	1.6
Other public third party	95	0.1
Private Funding		
Private donations	1,433	2.0
Private third party	13,844	19.5
Client fees	14,177	19.9
Other	3,083	4.3
Unknown	4,981	7.0
Total	\$71,167	100.0%

Source: NDATUS, 1991

\$29.5 million, or 41.4% of total treatment costs. State and local government funding accounted for \$25.3 million, with other public sources, such as Medicaid,

Medicare, public welfare and the federal government, contributing an additional \$8.4 million. Among the public sources, state government funding was the major source of treatment funding, accounting for \$12.3 million, or 17% of the total \$71.2 million.

Data gathered through NDATUS includes client demographic information. The survey data obtained for this report indicate that approximately 16% of clients received treatment for drug problems only, 37% received treatment for alcohol problems only, and 47% received treatment for dual abuse problems (Table 2.2). The relatively large percentage of patients receiving treatment for dual abuse problems reflects the nature of substance abuse and the patterns of addictive behavior. In a recent study of treatment completion rates in Washington, Wickizer et al. (1992) found that the great majority of clients in treatment abused more than one substance.

Table 2.2
Number of Clients Treated by Type of Disorder, Washington, 1990

Type of Disorder	Treatment Type		Total	Percentage (%)
	Inpatient	Outpatient		
Drug abuse	200	3,385	3,585	16.1
Alcohol abuse	402	7,917	8,319	37.2
Dual abuse	708	9,661	10,441	46.7
Total	1,382	20,963	22,345	100.0%

Source: NDATUS, 1991

The client population in Washington was mainly white (Table 2.3). According to NDATUS information, approximately 7.4% of the client population was black, while 4.1% was Hispanic. Overall, males accounted for 69% of the client population. Most of the clients receiving treatment were between the ages of 18 to 44 (Table 2.4). The single largest age group is 25-34, which accounted for approximately 32% of all clients. One of every 20 clients treated was under the age of 18.

Table 2.3
Number of Clients Treated by Ethnic Group, Washington, 1990

Ethnic Group*	Drug Abuse			(%)*	Alcohol Abuse			(%)*
	Inpatient	Outpatient	Total		Inpatient	Outpatient	Total	
White	126	2,583	2,709	76.3	329	6,284	6,613	79.5
Black	59	356	415	10.5	15	330	345	4.2
Hispanic	7	109	116	3.2	10	431	441	5.3
Asian	1	53	54	1.6	3	62	65	0.8
Native American	7	111	118	3.3	33	297	330	4.0
Other	0	17	17	0.5	0	38	38	0.4
Unknown	0	156	156	4.6	12	475	487	5.8
Total	200	3,385	3,585	100.0%	402	7,917	8,319	100.0%

Ethnic Group	Dual Abuse			(%)*	Total			(%)*
	Inpatient	Outpatient	Total		Inpatient	Outpatient	Total	
White	583	7,784	8,367	80.1	1,038	16,651	17,689	79.2
Black	105	796	901	8.6	179	1,482	1,661	7.4
Hispanic	29	344	373	3.6	46	884	930	4.1
Asian	8	69	77	0.8	12	184	196	0.9
Native American	44	372	416	4.0	84	780	864	3.9
Other	1	31	32	0.3	1	86	87	0.4
Unknown	10	265	275	2.6	22	896	918	4.1
Total	780	9,661	10,441	100.0%	1,382	20,963	22,345	100.0%

Source: NDATUS, 1991

*The percentage distribution of ethnic groups in the state general population is as follows: White - 84.1%; Black - 3.1%; Hispanic - 4.4%; Asian - 4.3%; Native American - 1.7%; Other - 2.4%.

Table 2.4
Number of Clients Treated by Age, Washington, 1990

Age	Drug abuse			(%)	Alcohol abuse			(%)
	Inpatient	Outpatient	Total		Inpatient	Outpatient	Total	
Under 18	3	51	54	1.5	12	162	174	2.1
18-24	55	547	602	16.8	37	1,109	1,146	13.8
25-34	85	1,108	1,193	33.3	112	2,383	2,495	30.0
35-44	46	1,102	1,148	32.0	112	1,911	2,023	24.3
45-54	7	235	242	6.8	66	1,081	1,147	13.8
55-64	2	45	47	1.3	22	402	424	5.1
65+	2	6	8	0.2	29	248	277	3.3
Unknown	0	291	291	8.1	12	621	633	7.6
Total	200	3,385	3,585	100.0%	402	7,917	8,319	100.0%

Age	Dual abuse			(%)	Total			(%)
	Inpatient	Outpatient	Total		Inpatient	Outpatient	Total	
Under 18	95	856	951	9.1	110	1,069	1,179	5.3
18-24	137	2,081	2,281	21.2	229	6,767	3,966	17.7
25-34	262	3,152	3,414	32.7	459	6,643	7,102	31.8
35-44	198	2,092	2,290	21.9	356	5,105	5,461	24.4
45-54	56	724	780	7.5	129	2,040	2,169	9.7
55-64	19	226	245	2.4	43	673	716	3.2
65+	6	62	68	0.7	37	316	353	1.6
Unknown	7	468	475	4.5	19	1,380	1,399	6.3
Total	780	9,661	10,441	100.0%	1,382	20,963	22,345	100.0%

Source: NDATUS, 1991

2.3 Summary

Treatment costs were estimated to be approximately \$71 million in 1990. Funding for treatment came from multiple sources. The two largest funding sources were private (41%), and state/local government (36%). Overall, treatment represented a small portion ($< 5\%$) of the total economic cost of substance abuse in Washington. In other words, for every \$10 of substance abuse costs, less than 50 cents was spent on treatment. Whether this modest investment is appropriate or inadequate given the overall costs of substance abuse, is an important question that cannot be evaluated by this analysis. What can be said is that treatment costs in relation to the overall economic cost of substance abuse in Washington are small in magnitude.

CHAPTER 3

MORBIDITY

Alcohol and drug use or dependence may adversely affect an individual's productivity at work as well as his or her capacity to function effectively in other roles. Many forms of lost work productivity are clearly evident in an individual's output, others are more difficult to detect. Examples would include a worker feeling "hung-over" or tired from substance use the night before, a worker using alcohol or drugs on the job, or a worker leaving the work site early to use drugs or consume alcohol. An individual's productivity in other non-work roles may also be affected by alcohol or drug use, e.g., performing cleaning or child care duties. In all of these cases, the reduced output can be measured as an economic loss. It is often assumed that the affected worker pays the consequences of his or her disorder, however, the costs are economic losses that society bears.

This chapter analyzes morbidity costs for Washington in 1990. A detailed discussion of the methodological procedure used for the analysis is provided in Appendix A at the end of the report.

Major findings of the analysis were:

- Total morbidity costs in 1990 were \$439.5 million.
- Approximately 81% of morbidity costs were attributable to alcohol use (Figure 3.1).
- Males accounted for 82.1% of the total costs (Figure 3.2).
- Individuals aged 35-44 accounted for the greatest proportion (35%) of morbidity costs (Figure 3.3).
- Morbidity costs represent 24.3% of the total economic cost of alcohol and drug abuse in Washington in 1990.

* Morbidity costs represent the general category of costs that arise from lost productivity due to alcohol- or drug-related impairment. These costs do not include costs for medical care, which are analyzed in Chapter 6.

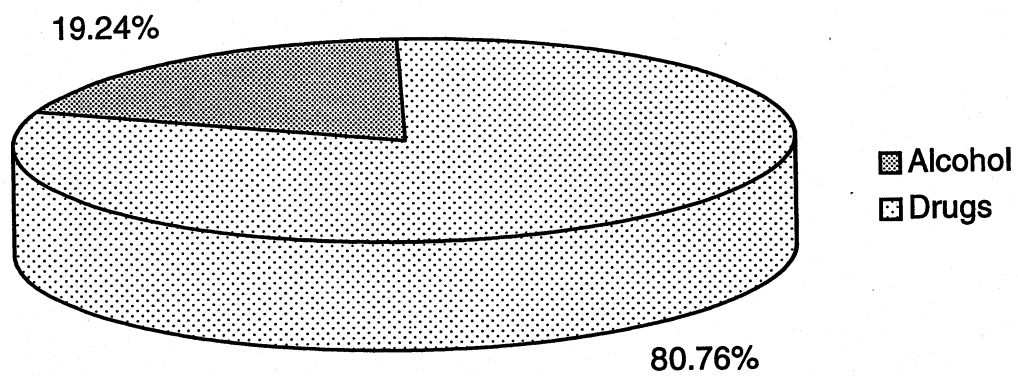


Figure 3.1
Morbidity Costs, Alcohol and Other Drugs

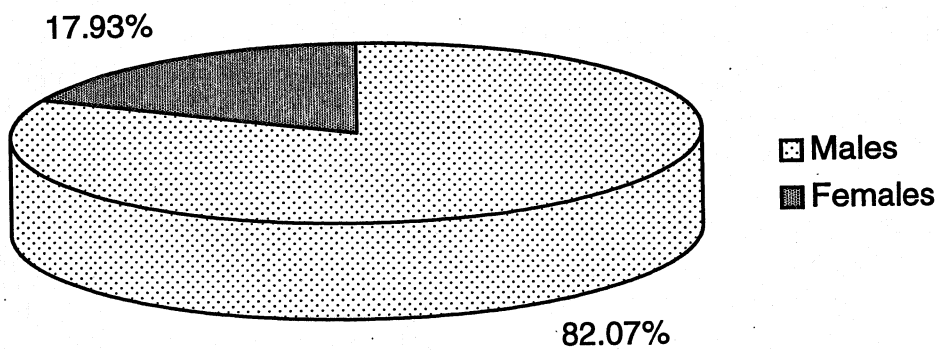


Figure 3.2
Morbidity Costs by Gender

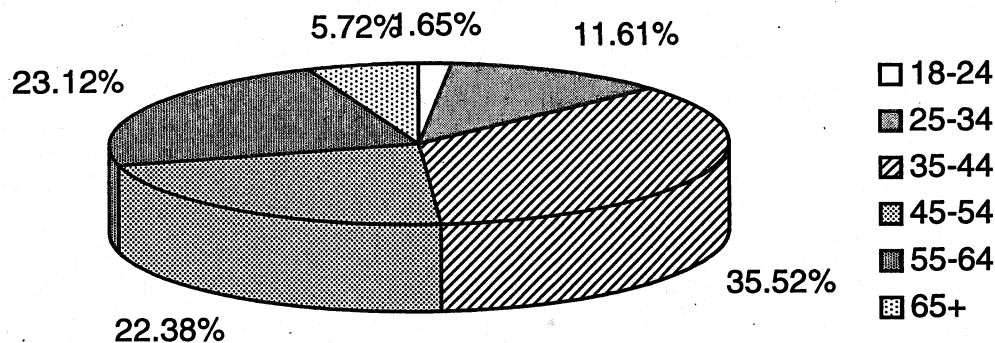


Figure 3.3
Morbidity Costs by Age

Note: Costs for persons aged 16-17 were too small to include in the figure. These costs represented 0.46% of total costs.

3.1 Methodology

Calculating lost productivity attributable to alcohol and drug abuse is a complicated process. Detailed information is outlined in Appendix A. In simplified terms, morbidity costs represent reduced productivity from alcohol and drug abuse measured in terms of either wage earnings for workers or housekeeping value for non-workers. Using wages or housekeeping values to measure lost productivity is the standard method used by the human capital approach (see Chapter 1).

Based on data from the Behavioral Risk Factor Survey (BRFS) for Washington and state population data, we estimated the number of alcohol and drug abusers for each age and sex group (Table 3.1). Then, we multiplied the number of substance abusers by the labor force participation rate to calculate the number of substance abusers working during 1990. Next, we calculated earnings for males and females by age, based on earnings data from the Bureau of the Census (1991) and from Rice et al. (1990). Then we multiplied the wage figures

by the appropriate impairment rate, obtained from Rice et al. (1990), to generate estimates of lost earnings due to alcohol and drug disorders (see Appendix A for a fuller discussion of the derivation of impairment rates). This procedure was repeated using data for housekeeping values to generate economic loss estimates for non-workers. Finally, the average loss per abuser was multiplied by the number of abusers to derive estimates of total morbidity costs.

3.2 Results

There were approximately 246,000 individuals in Washington during 1990 that abused alcohol according to Washington BRFSS data (Table 3.1). In addition, we estimated there were approximately 105,000 drug abusers, based on data extrapolated from epidemiological studies conducted outside Washington. (Data on drug abuse prevalence for Washington were unavailable). Labor force data indicated that approximately 190,000 alcohol abusers and 85,000 drug abusers worked during 1990 (Table 3.2).

Average male wage earnings ranged from \$6,735 to \$35,825 (Bureau of the Census 1991, Rice et al. 1990). Average earnings for females was considerably less, and ranged from \$4,417 to \$17,747. Included in the earnings estimates are housekeeping values, which represent imputed market values for maintaining the home. Housekeeping values are higher for females than males because the average female spends more time working to maintain the household than the average male. Housekeeping values are higher for persons aged 45-54 than for persons in other age groups because the earning potential of persons in this age group is higher, and housekeeping values reflect this. Table 3.3 presents the average earnings, including housekeeping values, by age and sex, as well as impairment rates showing the average percentage reduction in productivity, as measured by earnings, due to drug and alcohol abuse. For example, for males aged 55-64 the alcohol impairment rate is 9.3%, indicating that males in this age group are, on average, 9.3% less productive as a result of alcohol use.

Using the data presented in Tables 3.1 - 3.3, we calculated morbidity costs for males and females for different age groups (Table 3.4). Total morbidity costs for Washington in 1990 were estimated to be approximately \$439.5 million. Males accounted for \$360.7 million (82.1%), females accounted for the remaining \$78.8 million (17.9%). Alcohol was responsible for an overwhelming \$354.9 million, or

80.8% of the total morbidity costs. Other drugs were responsible for \$84.6 million, approximately 19.2% of the total losses. The higher costs associated with alcohol reflects the higher prevalence rates of alcohol abuse.

Table 3.1
Population, Prevalence, and Abusers by Age and Sex, 1990

		Alcohol Prevalence	Drug Prevalence	Alcohol Abusers	Drug Abusers
Male	[1]	[2] %	[3] %	[1*2]	[1*3]
16-17	53,683	22.0	7.0	11,810	37,58
18-24	1,79,870	15.7	8.6	28,240	15,469
25-34	417,316	9.3	5.6	38,810	23,370
35-44	393,829	12.8	2.7	50,410	10,633
45-54	249,213	12.6	2.7	31,401	6,729
55-64	182,814	17.4	0.7	31,810	1,280
65+	231,368	5.4	0.7	12,494	1,620
Total	1,708,093			204,975	62,858

		Alcohol Prevalence	Drug Prevalence	Alcohol Abusers	Drug Abusers
Female	[1]	[2] %	[3] %	[1*2]	[1*3]
16-17	50,594	12.0	6.0	6,071	3,036
18-24	164,523	3.1	6.7	5,100	11,023
25-34	420,677	0.5	3.4	2,103	14,303
35-44	397,553	1.7	1.9	6,758	7,554
45-54	246,076	1.8	1.9	4,429	4,675
55-64	194,609	2.9	0.4	5,644	778
65+	307,723	3.5	0.4	10,770	1,231
Total	1,781,755			40,877	42,600

Sources:

[1] Population: 1990 Washington State Census

[2] Alcohol Prevalence:

(1) Koss-Warner, D. (1989) A Statewide Report on Substance Use Among Public School Students in Washington in 1989

(2) Behavior Risk Factor Survey (BRFS) (1989), chronic drinking 2+ drinks per day

[3] Drug Prevalence:

(1) Koss-Warner, D. (1989) A Statewide Report on Substance Use Among Public School Students in Washington in 1989

(2) Epidemiology Catchment Area Surveys 1980-1984

(3) Grant BF (1990) NIAAA Percent Using Cocaine Use and Concurrent Use With Alcohol, % within last month

Table 3.2
Labor Force Participation Rates, Working and Non-Working Abusers by
Age and Sex, 1990

	Labor Force Participation Rates	Working Alcohol Abusers	Working Drug Abusers	Non- Working Alcohol Abusers	Non- Working Drug Abusers
Male	[1] %	[2]	[3]	[4]	[5]
16-17	60.0	7,086	2,255	4,724	1,503
18-24	79.6	22,479	12,313	5,761	3,156
25-34	97.2	37,724	22,715	1,087	654
35-44	97.5	49,150	10,368	1,260	266
45-54	93.2	29,266	6,271	2,135	458
55-64	69.1	21,980	884	9,829	395
65+	16.8	2,099	274	10,395	1,347
Total	79.6%	169,783	55,078	35,191	7,779

	Labor Force Participation Rates	Working Alcohol Abusers	Working Drug Abusers	Non- Working Alcohol Abusers	Non- Working Drug Abusers
Female	[1]	[2]	[3]	[4]	[5]
16-17	57.0	3,461	1,730	2,611	1,305
18-24	70.4	3,591	7,760	1,510	3,263
25-34	76.7	1,613	10,970	490	3,333
35-44	79.4	5,366	5,997	1,392	1,556
45-54	72.6	3,216	3,394	1,214	1,281
55-64	45.7	2,579	354	3,065	423
65+	8.0	864	9	9,909	1,132
Total	60.4%	20,687	30,307	20,189	12,293

Sources:

- [1] Labor Force Participation Rate (1990) Washington Labor Market and Economic Analysis
- [2,3] Produced by multiplying the alcohol and drug abusing populations by the labor force participation rates.
- [4,5] Produced by multiplying the alcohol and drug abusing populations by 100%- the labor force participation rates.

Table 3.3
Earnings, Housekeeping Rates, and Impairment Rates by Age and Sex,
1990

Male	Average	Housekeeping	Housekeeping	Impairment	
	Earnings		Not in the Labor	Alcohol	Drugs
	[1]	[2]	Force	[4]	[4]
			[3]		
16-17	\$6,735	\$2,172	\$4,274	1.4%	1.1%
18-24	\$9,802	\$2,688	\$5,570	1.4%	1.1%
25-34	\$23,659	\$3,241	\$6,165	3.0%	2.6%
35-44	\$33,324	\$3,521	\$6,464	5.5%	8.3%
45-54	\$35,825	\$3,538	\$6,480	5.5%	8.3%
55-64	\$30,966	\$3,783	\$6,725	9.3%	7.3%
65+	\$17,829	\$2,732	\$5,191	9.3%	7.3%

Female	Average	Housekeeping	Housekeeping	Impairment	
	Earnings		Not in the Labor	Alcohol	Drugs
	[1]	[2]	Force	[4]	[4]
			[3]		
16-17	\$4,417	\$5,552	\$11,043	0.8%	0.2%
18-24	\$8,615	\$8,375	\$13,866	0.8%	0.2%
25-34	\$12,423	\$9,678	\$15,106	2.8%	1.1%
35-44	\$15,179	\$10,176	\$15,665	11.9%	1.8%
45-54	\$16,350	\$8,840	\$14,331	11.9%	1.8%
55-64	\$17,747	\$8,685	\$14,238	18.7%	7.3%
65+	\$7,795	\$4,159	\$6,818	18.7%	7.3%

Sources:

- [1] Earnings: Bureau of the Census (1991) 1990 Money Incomes of Households, Families and Persons in the US
- [2,3] Housekeeping Values: Rice et al. (1990)
- [4] Impairment Rates: Rice et al. (1990)

Table 3.4
Total Morbidity Costs by Age and Sex, 1990

Male	Alcohol [1]	Drugs [2]	Total
16-17	\$1,166,301	\$291,575	\$1,457,876
18-24	\$4,379,861	\$1,885,054	\$6,264,915
25-34	\$30,644,007	\$15,991,998	\$46,636,005
35-44	\$100,049,006	\$31,847,986	\$131,896,992
45-54	\$64,119,964	\$20,734,898	\$84,854,862
55-64	\$77,180,716	\$2,437,236	\$79,617,952
65+	\$9,031,869	\$919,013	\$9,950,882
subtotal	\$286,571,724	\$74,107,760	\$360,679,484

Female	Alcohol [1]	Drugs [2]	Total
16-17	\$506,627	\$63,328	\$569,955
18-24	\$655,491	\$354,177	\$1,009,668
25-34	\$1,205,645	\$3,220,794	\$4,426,439
35-44	\$18,786,357	\$3,175,944	\$21,962,301
45-54	\$11,709,218	\$1,869,539	\$13,578,757
55-64	\$20,907,467	\$1,125,757	\$22,033,224
65+	\$14,559,304	\$649,552	\$15,208,856
subtotal	\$68,330,109	\$10,459,091	\$78,789,200
Total	\$354,901,833	\$84,566,851	\$439,468,684

Source:

[1,2] Calculated by multiplying the average loss per abuser by the population of abusers for each age and sex group.

3.3 Summary

The findings of the analysis presented in this chapter indicate that alcohol and drug abuse in Washington result in substantial economic loss through reduced productivity, with total costs for 1990 estimated to be on the order of \$440 million. The economic loss arose predominantly from alcohol abuse. Drug abuse accounted for less than 20% of the loss. Although our morbidity cost figures are high, we believe our estimates are reasonable and, if anything, perhaps conservative. Comparisons of our cost estimates for Washington with estimates from other studies are presented in the technical appendix. The lower cost estimates for Washington reflect, in part, the conservative approach taken for the analysis. Had we used less restrictive assumptions, our cost estimates would have been substantially larger.

CHAPTER 4

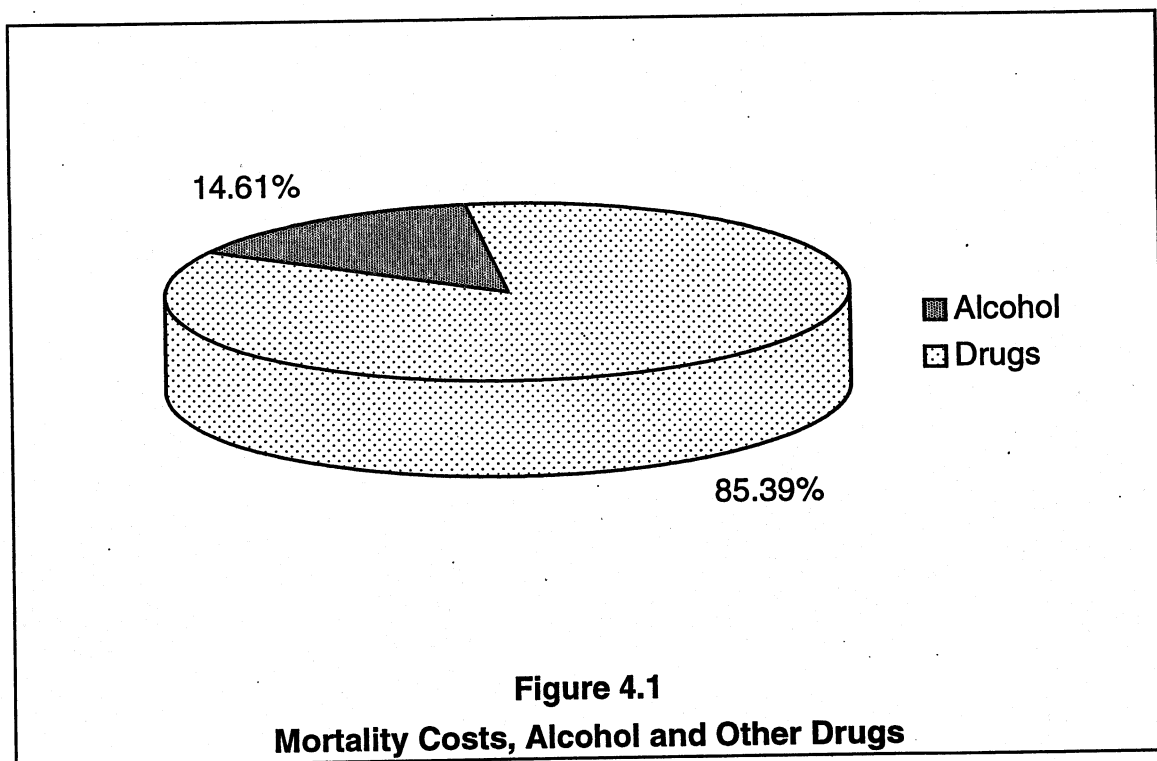
MORTALITY

The use of alcohol or drugs can lead to premature death through illness or injury, e.g. through auto accidents involving alcohol, through increasing the risk of cancer, cerebrovascular disease, and other related diseases, or through violence involving drugs or alcohol. When an individual dies prematurely, there is an economic cost to society in the form of loss of that individual's productive capacity. In general, premature death affects societal growth by diminishing the population's ability to contribute to economic growth through investing, consuming, and producing goods and services.

This chapter analyzes mortality costs for Washington for 1990 and addresses three objectives: (1) to determine the number of alcohol- and drug-related deaths, (2) to estimate the number of years of potential life lost from these deaths, and (3) to estimate the total economic costs of drug- and alcohol-related deaths by valuing the lifetime lost earnings of those who died from diseases or injuries related to alcohol or drug abuse.

The major findings of the analysis were:

- There were 2,155 deaths in 1990 related to drug or alcohol abuse: 1,931 were alcohol related and 224 were drug related.
- These 2,155 deaths resulted in 56,282 years of potential life lost.
- Major causes of death were:
 - motor vehicle accidents- 378 deaths
 - cerebrovascular disease (e.g. strokes)- 189 deaths
 - suicide- 188 deaths
 - alcoholic cirrhosis- 152 deaths
- Total mortality costs for 1990 were \$586 million, with alcohol abuse accounting for \$486 million, and drug abuse accounting for \$100 million (Figure 4.1).
- The average estimated cost per death measured in terms of lost earnings was \$272,000.



4.1 Methodology

Calculation of the number of deaths related to drug or alcohol abuse, years of potential life lost, and mortality costs, involved five steps. First, we determined how many people died from causes related to alcohol and drugs from death records provided by the Washington State Department of Health, Center for Health Statistics. Second, we calculated the number of years of potential life lost for these deaths. Third, we determined average wage earnings by age and sex group based on data from the Bureau of the Census and the Washington Labor Market and Economic Analysis. Fourth, with these earnings data, we calculated the lifetime earnings of individuals in specified age and sex groups and then discounted these earnings to the present time. Fifth, we multiplied the number of deaths by lifetime earnings to generate estimates of mortality costs. A more complete and detailed discussion of the methodology is provided in Appendix B.

4.2 Results

There were 2,155 deaths in Washington in 1990 caused by or related to drug or alcohol use. A breakdown of these deaths by age and sex is shown in Table 4.1 below. Alcohol accounted for 90% of all deaths, with the largest number of alcohol-related deaths occurring among individuals over 65. This was especially true for females. Sixty percent of the 656 females who died of alcohol-related disorders were over 65.

Table: 4.1
Alcohol- and Drug-Related Deaths by Age and Sex

Age	Alcohol Related Deaths				Drug Related Deaths			
	Female		Male		Female		Male	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
<1	1	0.15%	1	0.08%	0	0	0	0
1-18	35	5.34%	68	5.33%	4	5.41%	2	1.33%
19-24	24	3.66%	106	8.31%	2	2.70%	8	5.33%
25-34	40	6.10%	154	12.08%	19	25.68%	44	29.33%
35-44	51	7.77%	158	12.39%	17	22.97%	63	42.00%
45-54	48	7.32%	134	10.51%	11	14.86%	21	14.00%
55-64	63	9.60%	181	14.20%	9	12.16%	3	2.00%
65+	394	60.06%	473	37.10%	13	17.57%	10	6.67%
Total	656	100.00%	1275	100.00%	74	100.00%	150	100.00%

Source: State of Washington Center for Health Statistics 1990 death records.

Drug-related deaths were concentrated among persons aged 25-44. A relatively small proportion of individuals over age 65 died of drug-related causes. The differences between the pattern of alcohol- and drug-related deaths is indicative of the distinct behaviors associated with alcohol and drug use. Alcohol is more generally used by the entire population, while drugs tend to be more heavily used by younger males and females (see Table 3.1 for alcohol and drug prevalence rates by age and sex). Also, chronic alcohol use increases the risk of cancer and other diseases associated with older age (NIAAA, 1992).

Additionally, more detailed information concerning alcohol- and drug-related deaths is presented in Tables 4.2 and 4.3, respectively. These tables are

organized by diagnosis and show how the mortality estimates were derived. Table 4.2 includes a column labeled alcohol attributable fraction (AAF) which represents the percentage of deaths within a given diagnosis assumed to be attributable to alcohol. For example, the AAF for acute alcoholic hepatitis is 1 indicating 100% of deaths in this category were due to alcohol. In contrast, the AAF for cancer of the larynx is .5 indicating 50% of the deaths in this category were due to alcohol. Table 4.3 has a column labeled drug attributable fraction (DAF) which represents the corresponding information for the set of disease categories listed in the table. Multiplying the total number of deaths within a given diagnostic category by the AAF or DAF gives an estimate of the number of deaths attributable to drug or alcohol use. The AAF and DAF values used to estimate substance abuse-related mortality costs were taken from Rice et al. (1990). These values are based on research reported by Parker et al. (1985), Ravenholt (1984) and Roizen (1985).

As shown in Table 4.2, motor vehicle accidents accounted for the greatest number of alcohol-related deaths (378), followed by cerebrovascular disease (189), suicide (188), and alcoholic cirrhosis (152). For drugs, accidental poisoning and undetermined injuries accounted for the greatest number of deaths, 81 and 59, respectively.

A second objective of the analysis was to estimate the number of years of potential life lost (YPLL) due to drug and alcohol use. A description of the methodology used for this calculation is included in the technical appendix to this chapter. In simple terms, YPLL was estimated by multiplying the number of deaths by the average life expectancy for a given age-sex category.

We estimated that in Washington in 1990, 56,282 years of potential life were lost due to alcohol or drug use. Table 4.4 presents the YPLL by age and sex group. As Table 4.4 shows, alcohol accounted for most years of potential life lost: 48,692 years for alcohol versus 7,590 years for drugs. The category representing the single greatest number of years of lost life was males 25-34 dying of alcohol-related causes. This category accounted for 6,756 years of potential lost life in Washington in 1990, or 12% of the total years of life lost.

We estimated that the average cost per death was \$272,183, which was calculated by dividing the total mortality cost by the total number of deaths within a given age-sex category (see Table 4.4). In other words, for every person who died in 1990 from some disorder related to alcohol or drugs, society experienced an average loss of approximately \$272,000. As Table 4.4 shows, however, the estimated cost per death varied considerably. For example, for males aged 55-64 the cost per death was much lower than for males aged 25-34, similarly, costs were higher for males than females. These differences are a function of relative wage earnings and years of potential life lost. Thus, the estimated cost per death represents a narrow –and admittedly arbitrary–economic construct of the value of life.

The total estimated mortality cost associated with drug and alcohol use was \$586 million (see Table 4.4). This figure represents a significant portion of the total economic cost of drug and alcohol abuse in Washington, accounting for approximately 32% of the total costs.

These cost estimates are based on two key assumptions. First, it was assumed individuals retire at the age of 75, so that the age of the working population is between 16 and 75. Second, it was assumed that an individual's productivity, hence real future income, would grow 1% annually based on his or her present income. In calculating the cost estimates we followed Rice et al (1990) and Liu (1992) and we used a 4% discount rate.

4.3 Summary

In 1990, 2,155 people died in Washington from substance abuse-related causes involving 56,000 years of potential life lost, representing a cost of over \$.5 billion in diminished human productivity. Approximately 85% of this cost was related to alcohol abuse. The larger number of alcohol-related deaths is partly due to the greater number of Washington residents who abuse alcohol compared to those who abuse drugs (see Chapter 3, Table 3.1), and also due to the greater number of disorders associated with alcohol consumption.

Table: 4.2
Deaths Attributable to Alcohol by Diagnosis and Sex

Diagnoses	ICD-9-CM	Alcohol Attributable Fraction	Age (Years)	Total Deaths	Male		Female	
					Total Deaths	Alcohol Related Deaths	Total Deaths	Alcohol Related Deaths
[1]								
<u>Direct Causes</u>								
Acute alcoholic hepatitis	571.1	1	≥15	14	10	10	4	4
Alcohol abuse	305.0	1	≥15	10	8	8	2	2
Alcohol dependence	303	1	≥15	87	63	63	24	24
syndrome								
Alcoholic cardiomyopathy	425.5	1	≥15	11	9	9	2	2
Alcoholic cirrhosis	571.2	1	≥15	152	100	100	52	52
Alcoholic fatty liver	571.0	1	≥15	1	1	1	0	0
Alcoholic liver damage	571.3	1	≥15	38	26	26	12	12
Alcoholic psychoses	291	1	≥15	13	7	7	6	6
Fetal alcohol syndrome	760.71	1	≥0	1	1	1	0	0
Alcohol poisoning	E860.0-E860.1	1	≥15	1	1	1	0	0
<u>Indirect Causes</u>								
Cancer of the esophagus	150	0.75	≥35	190	140	105	50	37.5
Cancer of the larynx [2]	161	0.5	≥35	43	30	15	13	5.2
Cancer of the liver	155	0.15	≥35	149	85	12.75	64	9.6
Cancer of the oral cavity [2]	140-149	0.5	≥35	138	96	48	42	16.8
Cancer of the stomach	151	0.2	≥35	235	157	31.4	78	15.6
Respiratory tuberculosis	011-012	0.25	≥35	7	5	1.25	2	0.5
Diabetes mellitus	250	0.05	≥35	749	331	16.55	418	20.9
Essential hypertension	401	0.08	≥35	73	22	1.76	51	4.08
Cerebrovascular disease	430-438	0.07	≥35	2697	1077	75.39	1620	113.4
Pneumonia and influenza	480-487	0.05	≥35	1383	571	28.55	812	40.6
Diseases of the stomach, esophagus, duodenum	530-537	0.1	≥35	189	90	9	99	9.9
Other cirrhosis of liver	571.5-571.6	0.5	≥35	168	102	51	66	33
Chronic pancreatitis	577.1	0.6	≥35	6	5	2.5	1	0.6

Table 4.2 (continued)

Table 4-2 (Continued)								
Diagnoses	ICD-9-CM	Alcohol Attributable Fraction	Age (Years)	Total Deaths	Male		Female	
					Total Deaths	Alcohol Related Deaths	Total Deaths	Alcohol Related Deaths
[1]								
<u>Unintentional Injuries</u>								
Accidental drownings	E910	0.38	≥0	90	68	25.84	22	8.36
Accidental falls	E880-E888	0.35	≥15	257	145	50.75	112	39.2
Accidents caused by fire	E890-E899	0.45	≥0	61	43	19.35	18	8.1
Air and transport accidents	E840-E845	0.16	≥0	24	22	3.52	2	0.32
All other accidents	E868-E869	0.25	≥15	6	6	1.5	0	0
All other accidents	E900-E909	0.25	≥15	17	16	4	1	0.25
All other accidents	E911-E929	0.25	≥15	181	142	35.5	39	9.75
Motor vehicle accidents	E810-E825	0.42	≥0	899	641	269.22	258	108.36
Other road vehicle accidents	E826-E829	0.2	≥0	5	3	0.6	2	0.4
Water transport accidents	E830-E838	0.2	≥0	52	45	9	7	1.4
<u>Intentional Injuries</u>								
Suicide	E950-E959	0.28	≥15	672	533	149.52	139	38.92
Homicide	E960-E969	0.46	≥15	247	179	82.34	68	31.28
Total				8866	4780	1275.29	4086	656.02

Notes:

- [1] Deaths occurring before this age are not included in the calculations.
 [2] The AAF for females is 0.40.

Sources:

1. State of Washington Health Statistic Death Tape for 1990.
2. International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM), 3rd Edition, Practice Management Corporation.
3. Rice et al (1990).

Table: 4.3
Deaths Attributable to Drugs by Diagnosis and Sex

Diagnoses	ICD-9-CM	Drug Attributable Fraction	Age (Years)	Total Deaths	Male		Female	
					total deaths	Drug Related Deaths	total deaths	Drug Related Deaths
<u>Direct Causes</u>								
Drug dependence	304	1	≥0	2	1	1	1	1
Nondependent abuse of drugs	305.1-305.9	1	≥0	20	12	12	8	8
Accidental poisoning by drugs	E850-E859	1	≥0	81	52	52	29	29
Undetermined injury from drugs	E980	1	≥0	59	41	41	18	18
<u>Indirect Causes</u>								
AIDS [1]	042-044	0.05	≥0	339	322	16.95	17	6.8
Hepatitis B	070.3	0.28	≥0	23	15	4.2	8	2.24
Homicides	E960-E969	0.13	≥15	247	179	23.27	68	8.84
Total				771	622	150.42	149	74

Notes:

Numbers may not add due to rounding.

[1] The Drug Attributable Fraction for females is .40

Sources:

1. State of Washington Health Statistic Death Tape for 1990.
2. International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM), 3rd Edition, Practice Management Corporation.
3. Rice et al (1990).

Table: 4.4
Mortality Costs, Year of Potential Life Lost (YPLL), and Cost per Death

Age	Alcohol			Drugs			Total		
	Costs	YPLL	Cost per death	Costs	YPLL	Cost per death	Costs	YPLL	Cost per death
Male									
<1	\$339,555	62	\$390,293	\$0	0	\$0	\$339,555	62	\$390,293
1-18	\$34,620,100	4328	\$507,924	\$1,010,769	126	\$507,924	\$35,630,869	4455	\$507,924
19-24	\$72,973,910	5425	\$688,693	\$5,495,770	409	\$688,693	\$78,469,680	5834	\$688,693
25-34	\$108,039,259	6756	\$700,462	\$30,820,328	1867	\$700,462	\$138,859,587	8623	\$700,462
35-44	\$93,908,791	5506	\$593,533	\$37,149,231	2109	\$593,533	\$131,058,022	7615	\$593,533
45-54	\$51,171,138	3481	\$382,245	\$7,908,650	512	\$382,245	\$59,079,787	3993	\$382,245
55-64	\$29,129,621	3292	\$161,035	\$502,429	57	\$161,035	\$29,632,050	3349	\$161,035
65+	\$16,577,669	4305	\$35,042	\$362,685	94	\$35,042	\$16,940,354	4399	\$35,042
Total	\$406,760,044	33155	\$318,955	\$83,249,860	5174	\$551,561	\$490,009,904	38329	\$343,867
Female									
<1	\$273,924	99	\$217,400	\$0	0	\$0	\$273,924	99	\$217,400
1-18	\$10,004,157	2482	\$282,923	\$1,032,669	256	\$282,923	\$11,036,826	2739	\$282,923
19-24	\$8,710,889	1423	\$358,178	\$573,085	94	\$358,178	\$9,283,974	1516	\$358,178
25-34	\$13,804,340	1980	\$347,279	\$6,553,155	840	\$347,279	\$20,357,495	2820	\$347,279
35-44	\$15,267,049	2044	\$300,296	\$5,087,014	601	\$300,296	\$20,354,063	2644	\$300,296
45-54	\$10,564,301	1479	\$221,381	\$2,413,053	276	\$221,381	\$12,977,354	1755	\$221,381
55-64	\$7,495,843	1418	\$118,925	\$1,048,919	198	\$118,925	\$8,544,761	1617	\$118,925
65+	\$13,278,290	4612	\$33,685	\$437,231	152	\$33,685	\$13,715,521	4764	\$33,685
Total	\$79,398,793	15536	\$120,948	\$17,145,125	2417	\$227,379	\$96,543,919	17953	\$132,252
Total									
<1	\$613,479	161	\$288,018	\$0	0	\$0	\$613,479	161	\$288,018
1-18	\$44,624,257	6810	\$431,069	\$2,043,438	383	\$362,312	\$46,667,695	7193	\$427,516
19-24	\$81,684,799	6848	\$626,994	\$6,068,855	502	\$633,492	\$87,753,654	7350	\$627,439
25-34	\$121,843,599	8735	\$628,092	\$37,373,483	2707	\$600,324	\$159,217,082	11443	\$621,574
35-44	\$109,175,840	7550	\$522,223	\$42,236,245	2709	\$535,530	\$151,412,085	10259	\$525,754
45-54	\$61,735,439	4960	\$339,972	\$10,321,703	788	\$332,168	\$72,057,141	5748	\$338,910
55-64	\$36,625,464	4710	\$150,154	\$1,551,348	255	\$129,929	\$38,176,811	4966	\$149,210
65+	\$29,855,960	8917	\$34,425	\$799,916	246	\$34,287	\$30,655,876	9163	\$34,422
Total	\$486,158,837	48692	\$251,666	\$100,394,985	7590	\$448,966	\$586,553,823	56282	\$272,183

CHAPTER 5

CRIME

The relationship between drugs and alcohol and crime is complex. While there is little empirical evidence of a direct causal relationship, there is some indication that these substances can act as disinhibitors, allowing anti-social tendencies to evolve into criminal activities (Tonry and Wilson, 1990). A prime example of this is domestic violence, wherein the batterer exhibits excessively controlling behaviors when sober, but only becomes assaultive while under the influence of alcohol (Chaiken and Chaiken, 1990). Most researchers (see Tonry and Wilson, 1990) agree there is a strong link between substance use/abuse and crime, whatever the exact nature of that association may be. In 1989, the National Institute of Justice's Drug Use Forecasting system determined that levels of drug use among individuals arrested for felonies were higher than previously thought. In some cities as much as 50%-85% of those arrested tested positive for drug use (Tonry & Wilson 1990). Chaiken and Chaiken (1990) summarized a number of ethnographic and longitudinal studies which indicate that, among predatory offenders, high frequency drug users are very likely to be high-rate offenders, committing many different kinds of crimes, including violent crimes.

This chapter analyzes the costs of crime for Washington in 1990 related to drug and alcohol abuse. More specifically, it addresses four major categories of costs associated with substance abuse and crime: (1) Law Enforcement Costs, (2) Judicial Costs, (3) Correctional Costs, (4) Other Societal Costs.

The major findings of the analysis were:

- Of 239 arrests for homicide in 1990, 72 (30%) were associated with alcohol use, and 24 (10%) were associated with drug use.
- Of 7,663 arrests for felonious assault, 2,061 (27%) were related to alcohol use, and 766 (10%) were related to drug use.
- Of 7,068 arrests for burglary, 332 (4.7%) were related to alcohol use, and 1,583 (22.4%) were related to drug use.
- Total estimated drug- and alcohol-related crime costs in Washington for 1990 were \$348 million.
- The distribution of costs was as follows (see Figure 5.1):
 - Law enforcement -- \$173.9 million
 - Judicial -- \$18.9 million
 - Correctional-- \$86.2 million
 - Other social-- \$68.9 million
- Crime costs represent 19% of the total economic cost of drug and alcohol abuse

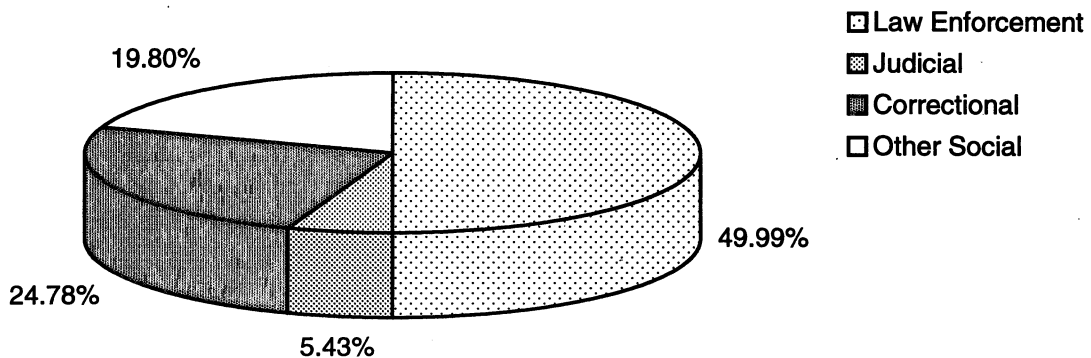


Figure 5.1
Crime Costs

5.1 Methodology

In analyzing crime costs, we followed the same general methodology as Rice et al. (1990). That is, we gathered information from different sources on criminal activity (offenses, arrests, etc.), prison populations, numbers of crime victims, property destruction, etc. Then we adjusted data on these variables to reflect criminal activity related specifically to drug or alcohol use. Whenever possible, we used statewide data from Washington. When such data were not available, national data were used and cost estimates were then extrapolated to Washington.

Following Rice et al. (1990), we limited our analysis to a restricted set of crimes believed to be linked to drug or alcohol use. These crimes included several Part I felony offenses: homicide, felonious assault (aggravated assault and forcible rape), robbery (taking from a person), burglary (breaking and entering), larceny (theft of property), and auto theft. Less serious Part II offenses analyzed included driving while intoxicated (DWI), liquor law violations, public drunkenness, stolen property (buying, receiving, and possessing), prostitution, and drug law violations (possession, sale, use, or manufacture).

We obtained estimates of the number of drug- and alcohol-related crimes by multiplying crime figures by attributable fractions in the same manner as done to derive mortality cost estimates. These attributable fractions ranged from 3.8% for alcohol-related larceny crimes to 100% for DWI. In other words, it was assumed that 3.8% of all larcenies are related to alcohol use. By definition, 100% of all DWI violations are related to alcohol use. The attributable fraction values were taken from Rice et al. (1990) and are based on earlier research conducted by Cruze et al. (1981) and Harwood et al. (1984).

The attributable fractions used for the analysis are shown below:

	<u>Alcohol</u>	<u>Drugs</u>
Homicide	30.0%	10.0%
Felonious Assault	26.9%	10.0%
Robbery	3.9%	26.8%
Burglary	4.7%	22.4%
Larceny	3.8%	18.6%
Auto Theft	4.6%	18.6%
Stolen Property	--	18.6%
Prostitution	--	12.8%

To derive some cost estimates (correctional and judicial costs), it was necessary to convert numbers of arrests or offenses into dollar equivalents. To do this, we followed the method used by Rice et al. (1990), which assumed that costs were proportional to the number of crimes committed. While the validity of this assumption is questionable, it simplified the analysis and provided a straightforward method of estimating crime costs. For example, burglary represented 16.8% of all Part I offenses, so it was assumed to account for 16.8% of all police protection costs. This assumption may introduce some error into the cost estimates for specific crime categories (e.g., homicide, assault, etc.). Therefore, readers should use caution in interpreting the cost figures presented in the tables.

5.2 Results

Law Enforcement Costs

Police Protection:

To calculate an estimate of police protection costs, we obtained data on the number of known offenses for Part I crimes and the number of arrests for Part II crimes, as reported by the *Washington Association of Sheriffs and Police Chiefs 1990 Annual Report*. The numbers of offenses and arrests were then multiplied by the appropriate attributable fraction to obtain an estimate of drug- and alcohol-related offenses and arrests (see Table 5.1). As Table 5.1 shows,

among Part I felonies, drug-related larceny and burglary were the categories with the greatest number of offenses, 36,171 and 13,876, respectively.

Police protection costs were estimated to be \$100.9 million. Approximately \$1 of every \$5 spent for police protection in Washington in 1990 represented expenditures related to drugs or alcohol (\$100.9 of \$452.1 million).

Drug Control Costs:

In recent years, drug traffic control has become a national priority. Very few sectors of the federal government have been untouched by the effort to curb if not eradicate the supply of and demand for illicit drugs in this country. Because so many different agencies are involved in drug control efforts, it was difficult to estimate accurately expenditures on drug control in Washington. The estimate presented here is based on national budget figures reported in *The Sourcebook of Criminal Justice Statistics 1991*.

The cost estimates for drug control in Washington are presented below in Table 5.2. To derive state estimates, we computed per capita costs based on national data, then extrapolated these per capita costs to Washington. As shown, total drug control costs for Washington were estimated to be \$73 million, with interdiction and investigations accounting for 75% of these costs.

Table 5.1
Police Protection Costs, Washington, 1990
(\$ in thousands)

Type of Offense	Number of Known Offenses	Number of Alcohol - and Drug - Related Offenses		Alcohol-Related Costs	Drug-Related Costs	Total Costs
	(1)	Alcohol	Drug	(2)	(2)	
Part I						
Homicide	253	76	25	\$93	\$31	\$124
Felonious Assault	18,165	4,886	1,817	\$6,007	\$2,233	\$8,240
Robbery	6,508	254	1,744	\$216	\$1,449	\$1,664
Burglary	61,945	2,911	13,876	\$3,579	\$17,058	\$20,637
Larceny	194,470	7,390	36,171	\$6,138	\$30,045	\$36,183
Auto Theft	23,018	1,059	4,281	\$1,302	\$5,263	\$6,565
Part II						
DWI	38,554	38,554		\$1,403		\$1,403
Liquor Laws	24,160	24,160		\$879		\$879
Public Drunkenness	32	32		\$1		\$1
Stolen Property	3,759		521		\$1,146	\$1,146
Prostitution	2,801		1,935		\$588	\$588
Drug Laws	15,118		15,118		\$23,491	\$23,491
Total	388,783	79,322	75,488	\$19,618	\$81,303	\$100,921

Sources:

- 1) *Crime in Washington State, 1990 Annual Report*, Washington Association of Sheriffs and Police Chiefs, p. 83
Seattle Police Department, Report #CHS500, April 3, 1991.
- 2) Total criminal justice system expenditures for FY 1990 equal \$452,143,000. Police protection costs for DUI, Liquor Laws, Public Drunkenness estimated at \$36.39 per offense (see Rice et al, 1990).

Table 5.2
Drug Control Expenditures, Washington, 1990
(\$ in millions)

Type of Activity	Estimated Expenditures
Interdiction	\$34
Investigations	\$21
International	\$10
Intelligence	\$1
Research & Development	\$6
Regulatory & Compliance	<\$0.5
Total	\$73

Source: Drug Enforcement Administration 1990 Budget Report

Judicial Costs

Legal and adjudication costs were estimated based on the number of *arrests* for Part I and II crimes (Table 5.3). As shown, there were far fewer arrests for most Part I crimes than offenses (see Tables 5.1 and 5.3). Following the same methodology as used to estimate police protection costs, we estimated that legal and adjudication costs (both public and private) were \$18.9 million.

Correctional Costs

State Corrections Costs:

State corrections costs were estimated to be \$56.6 million (Table 5.4). Cost estimates related to specific crime categories (e.g., burglary, robbery, etc.) were based on the percentage of inmates within each crime category. This percentage figure was multiplied by the appropriate attributable fraction, and then multiplied again by the total corrections costs. This yielded an estimate of the total correctional costs associated with drug and alcohol abuse.

Table 5.3
Legal and Adjudication Costs, Washington, 1990
(\$ in thousands)

Type of Offense	Number of Arrests (1)	Number of Alcohol- and Drug-Related Arrests (Alcohol) (2)	Alcohol-Related Costs (2)	Drug-Related Costs (2)	Total Costs
Part I					
Homicide	239	72	\$68	\$23	\$91
Felonious Assault	7,663	2,061	\$1,957	\$727	\$2,684
Robbery	1,479	58	\$55	\$376	\$431
Burglary	7,068	332	\$315	\$1,503	\$1,818
Larceny-Theft	45,867	1,743	\$1,655	\$8,099	\$9,753
Auto Theft	3,509	161	\$153	\$620	\$773
Part II					
DWI	38,554	38,554	\$1,403		\$1,403
Liquor Laws	24,160	24,160	\$879		\$879
Public Drunkenness	29	29	\$1		\$1
Stolen Property	3,759			\$707	\$707
Prostitution	2,801			\$363	\$363
Drug Laws	15,118			\$14	\$14
Total	150,246	67,170	\$6,486	\$12,432	\$18,918

Sources:

- 1) *Crime in Washington State 1990 Annual Report*, Washington Association of Sheriffs and Police Chiefs, pp. 35-38. Seattle Police Department, Report #CHS500, April 3, 1991
- 2) Total legal and adjudication costs, \$228,605,000 from *State Justice Sourcebook of Statistics and Research*, 1991, U.S. Dept. of Justice, Office of Justice Programs, Bureau of Justice Statistics.

As shown in Table 5.4, there were 5,978 inmates in prison during 1990 within the eight crime categories analyzed. It was estimated that 766 of these inmates were in prison for alcohol-related crimes, and 2,067 for drug-related crimes. Homicide and felonious assault accounted for the largest number of inmates for the alcohol area, while drug crimes, robbery, and burglary accounted for most of the inmates within the drug area. Of the estimated \$56.6 million in state corrections costs, \$41.3 million represented drug-related incarceration costs.

Local Corrections Costs:

Admissions to local jails, as reported in the *Jail Information Program 1991 Annual Report*, provided the basis for estimating local corrections costs. Following the same procedure used to estimate state corrections costs, we calculated the local corrections costs for 1990 at \$29.6 million. Of this amount, \$25.8 million represented drug-related costs, and \$3.8 million alcohol-related costs. The magnitude of drug-related costs reflects the large number of admissions (2,228) to local jails in 1990 for drug crimes (possession, distribution, or manufacture of illegal substances) (Table 5.5).

Other Social Costs

Other social costs are costs that may not be directly or explicitly borne by any group or organization, but are costs to society. This cost category includes the costs of lost productivity due to incarceration, the value of lost productivity due to criminal victimization, and the cost of property damage arising from substance abuse-related accidents.

Table 5.4
State Corrections Costs, Washington, 1990
(\$ in thousands)

Type of Offense	Total Inmates (1)	Inmate Population		Alcohol- Related Costs (2)	Drug- Related Costs (2)	Total Costs
		(Alcohol)	(Drug)			
Homicide	1,248	374	125	\$7,479	\$2,493	\$9,971
Felonious Assault	1,094	294	109	\$5,878	\$2,185	\$8,063
Robbery	1,180	46	316	\$919	\$6,317	\$7,236
Burglary	933	44	209	\$876	\$4,175	\$5,050
Theft	174	7	32	\$132	\$646	\$779
Auto Theft	30	1	6	\$28	\$111	\$139
Stolen Property	60		11		\$223	\$223
Drug Crime	1,259		1,259		\$25,148	\$25,148
Total	5,978	766	2,067	\$15,312	\$41,298	\$56,610

Sources:

- 1) *Client Characteristics and Population Movement Report for Fiscal Year 1990*, State of Washington Department of Corrections Institutions and Work Training Release.
- 2) *State Justice Sourcebook of Statistics and Research, 1991*, U.S. Department of Justice, Bureau of Justice Statistics.

Table 5.5
Local Corrections Costs, Washington, 1990
(\$ in thousands)

Type of Offense	Number of Local Admissions (1)	Number of Alcohol- and Drug-Related Admissions in Local Institutions		Alcohol- Related Costs (2)	Drug- Related Costs (2)	Total Costs
		(Alcohol)	(Drug)			
Homicide	40	12	4	\$101	\$34	\$134
Felonious Assault	604	162	60	\$1,365	\$508	\$1,873
Robbery	171	7	46	\$56	\$385	\$441
Property (Burglary, Larceny)	3,335	142	684	\$1,191	\$5,746	\$6,937
Drug Crime	2,228		2,228		\$18,725	\$18,725
Sex Crimes	473	127	47	\$1,069	\$398	\$1,467
Total	6,851	450	3,069	\$3,782	\$25,796	\$29,577

Sources:

- 1) *Jail Information Program 1991 Annual Report*, Washington Association of Sheriffs and Police Chiefs.
- 2) Total local corrections costs from *Sourcebook of Criminal Justice Statistics 1991*, Bureau of Justice Statistics.

Productivity Losses Due to Incarceration:

Inmates of state prisons and local jails are not able to participate in the economy as workers. This represents a substantial economic cost to society in the form of lost productivity. Data on state prison and local jail inmates were obtained from secondary sources and used to calculate the number of years served in prison or jail for each crime category. (Since we were estimating annual costs, the maximum time served was defined as 12 months, even though for some crimes, e.g., homicide, the actual average time served was greater than 12 months.) The cost estimates for this category were based on wage rates of people with 1-3 years of high school. This wage rate is considerably lower than the overall wage rate and reflects a conservative assumption about the earnings potential of inmates.

The findings are presented in Table 5.6. Total productivity losses due to incarceration were estimated to be \$46.6 million for 1990, with \$36.6 million representing productivity losses for incarceration in state correctional facilities. Over 70% (\$34.8 million) of the total cost of lost productivity was drug related.

Property Destruction:

Since statewide data on property destruction were not available, we used national data to derive the cost estimates for this area. The analysis considered property damage arising from the following crimes: robbery, assault, larceny, burglary, and motor vehicle theft. We computed the percentage of known offenses nationally for 1990 that occurred in Washington. (Approximately 1% - 2.5% of known offenses occurred in Washington.) Using national data on the cost of property destruction, we estimated Washington costs by multiplying national figures by the corresponding Washington percentage value. We then applied the corresponding drug and alcohol attributable fractions to obtain estimates of property damage costs in Washington related to drug and alcohol abuse.

The findings are presented in Table 5.7. Overall, property damage costs were estimated to be \$10.2 million, with drugs accounting for \$8.1 of this amount. Property damage due to burglary accounted for \$6.3 million of the total cost.

Table 5.6
Productivity Losses Due to Incarceration, Washington, 1990
(\$ in thousands)

Type of Offense	Drugs		Alcohol		Total Losses (\$)
	Person Years Served	Productivity Losses (\$)	Person Years Served	Productivity Losses (\$)	
State Prisons					
Homicide	124.8	1,808.5	374.4	5,425.6	7,234.1
Felonious Assault	109.4	1,585.4	294.3	4,264.7	5,850.1
Robbery	316.2	4,582.2	46.0	66.7	4,648.9
Burglary	209.0	3,028.7	43.9	63.6	3,092.3
Larceny	32.4	469.5	6.6	95.6	565.1
Auto Theft	5.6	81.2	1.4	20.3	101.5
Drug Laws	1032.4	14,960.9	0.0	0.0	14,960.9
Stolen Property	11.2	162.3	0.0	0.0	162.3
Total	1841.0	\$26,678.6	766.6	\$9,936.5	\$36,615.1
Local Jails					
Homicide	1.8	25.5	5.3	76.5	102.0
Assault	16.9	246.4	45.5	659.4	905.8
Robbery	14.2	205.9	2.1	30.0	235.9
Property (Burglary, Larceny)	116.2	1,684.3	24.1	349.2	2,033.5
Drug Crime	401.0	5,811.6	0.0	0	5,811.6
Sex Crimes	12.8	185.2	34.4	497.9	683.1
Total	562.9	\$8,157.2	111.4	\$1,614.3	\$9,771.9
Total State & Local	2,403.9	\$34,835.8	878.0	\$11,550.8	\$46,387.0

Notes:

- 1) Productivity was based on average annual earnings of \$14,156

Sources:

- 1) *Client Characteristics and Population Movement Report for Fiscal Year 1990*, State of Washington Department of Corrections Institutions and Work Release Training
- 2) Rice DP, et al (1990), *The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985*
- 3) *Jail Information Program 1991 Annual Report*, Washington Association of Sheriffs and Police Chiefs

Table 5.7
Property Destruction Due to Crime, Washington, 1990
(\$ in thousands)

Type of Offense	Property Destruction Losses	Alcohol- related Losses	Drug- related Losses	Total Losses (\$)
Robbery	\$1,237.3	48.3	331.6	379.9
Assault	\$1,150.5	309.5	0.0	309.5
Larceny	\$7,753.1	294.6	1,442.1	1,736.7
Burglary	\$23,405.3	1,100.0	5,242.8	6,342.8
Motor vehicle theft	\$61,177.9	281.4	1,137.9	1,419.3
Total		\$2,033.8	\$8,154.4	\$10,188.2

Sources:

- 1) Rice DP, et al. (1990), *The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985*
- 2) *Crime in Washington State, 1991, 1990 Annual Report*, Washington Association of Sheriffs and Police Chiefs

Criminal Victimization Costs:

The economic cost associated with criminal victimization is the value of lost productivity due to time lost from work. There are other costs of victimization, such as loss of dignity and diminished sense of well-being, but the economic value of these losses cannot be calculated.

Since no data were available on the numbers of crime victims in Washington State, the number of actual offenses for six Part I crimes was used. These were: forcible rape, aggravated assault, robbery, burglary, larceny, and auto theft. (Simple assault was not included in the analysis even though victims of this crime often take one or more days off work to recover.) It was conservatively assumed there was one victim for each actual offense, although data suggest the ratio of victims to offenses is greater than 1. The average number of days lost from work by crime was taken from the *Economic Costs of Alcohol and Drug Abuse in Texas-1989*. The number of actual offenses was multiplied by average days lost from work and the product was then multiplied by the appropriate drug or alcohol attributable fraction.

The findings are shown in Table 5.8. As indicated, the total economic loss in 1990 due to criminal victimization related to drug or alcohol abuse was \$12.3 million, with almost \$9.0 million being drug-related.

Table 5.8
Productivity Losses for Victims of Crime, Washington, 1990
(\$ in thousands)

Type of Offense	Number of Offenses	Average Work Days Lost	Alcohol Productivity Losses	Drug Productivity Losses	Total Productivity Losses
Forcible Rape	3,081	6.2	\$313	\$117	\$430
Aggravated Assault	14,547	3.8	\$1,249	\$160	\$1,410
Robbery	6,290	4.5	\$93	\$637	\$730
Burglary	60,801	2.1	\$504	\$2,402	\$2,907
Larceny	192,280	1.6	\$982	\$4,807	\$5,789
Motor vehicle theft	21,563	2.5	\$208	\$842	\$1,051
Total	298,562		\$3,350	\$8,966	\$12,315

Notes:

- 1) Productivity was based on average annual earnings of \$84/day, except forcible rape which is based on average daily earnings for women of \$61/day.

Sources:

- 1) *Crime in Washington State 1990 Annual Report*, Washington Association of Sheriffs and Police Chiefs, p. 83.
- 2) Liu LY, (1992) *Economic Costs of Alcohol and Drug Abuse in Texas-1989*.
- 3) Rice DP et al. (1990), *The Economic Cost of Alcohol and Drug Abuse and Mental Illness: 1985*.

Crime Careers:

Individuals who are addicted to cocaine and/or heroin often engage in criminal activities on a regular basis to support their habits to such an extent these activities can be considered "crime careers." People who engage in crime careers represent yet another source of lost productivity. Ideally, the economic loss resulting from this lost productivity should be evaluated and included in the

analysis. However, this is difficult to do for several reasons. Cocaine and heroin addicts often do hold jobs and generate income through a combination of legal and illegal activities. Also, there is a lack of clarity as to what constitutes abuse and what constitutes addiction. Both Rice et al. (1990) in their national study and Liu (1992) in her Texas study evaluated crime career costs.

We analyzed crime career costs, but do not include them as part of the total cost estimate because of our considerable uncertainty about the assumptions underlying the analysis and because of questionable data. Our analysis suggests crime career costs for Washington were on the order of \$150 million. This cost estimate reflects more conservative assumptions than used by either Rice et al. (1990) or Liu (1992). For example, the wage figures we used to calculate crime career costs were for persons with no high school education. In contrast, Rice et al. (1990) and Liu (1992) used much higher wage figures reflecting overall average wage rates.

The true crime career cost in Washington is difficult to know. Under highly restrictive assumptions regarding the prevalence of heroin and cocaine addiction and the percentage of addicted individuals who regularly engage in crime, the cost estimate would be lower than \$150 million, perhaps closer to \$75 to \$100 million. Had we included crime career costs in our analysis, our overall cost estimates for drug- and alcohol-related crime in Washington would have approached \$.5 billion.

5.3 Summary

Crime costs are a major component of the total economic cost of drug and alcohol abuse in Washington. Our analysis found crime costs to be a \$348 million; most of this cost was associated with drug abuse. The category with the greatest cost was law enforcement, \$174 million, followed by corrections, which accounted for \$86 million. Beyond the direct costs incurred for law enforcement, corrections, etc., drug and alcohol abuse engender substantial indirect social costs. For example, it was estimated that in 1990 in Washington there were 2,404 person years served by inmates of state prisons and local jails for crimes that were related to drug and alcohol abuse. The estimated indirect cost of this incarceration in terms of lost productivity was \$46 million.

CHAPTER 6

MEDICAL CARE

The use or abuse of alcohol or drugs may increase the risk of illness or injury requiring medical care treatment. Examples would include an individual who overdoses with drugs, an intoxicated driver involved in a serious auto accident, or a teenager who drinks too much too fast and as a result lapses into an alcoholic coma. In each of these cases, the individual would require medical care, which may involve costly hospitalization.

In addition to the above obvious examples, drug and alcohol use or abuse may act indirectly to increase health risk or to exacerbate other medical problems. For example, alcohol or drugs may weaken a person's immune system, thereby prolonging recovery from an unrelated illness. These indirect costs are also attributable to substance abuse and should be included in an analysis of medical costs.

This chapter analyzes medical care costs for Washington in 1990 related to drug and alcohol abuse. Four types of medical costs are analyzed: hospital inpatient direct costs, hospital inpatient indirect costs, outpatient direct costs, and medical costs related to motor vehicle accidents.

The major findings of the analysis were:

- The total medical care cost associated with drug and alcohol abuse for Washington in 1990 was \$215.8 million.
- Hospital direct costs were \$57.3 million, indirect costs \$49.2 million, and outpatient costs \$58.3 million. In addition, the cost of providing care for persons injured in auto accidents involving alcohol was estimated to be \$51.2 million.
- 17.5% of all hospital discharges represented patients with a secondary or tertiary diagnosis directly related to alcohol or drug abuse.
- The cost of treating hospitalized patients with drug and alcohol problems was often 20%-30% higher than other patients.

6.1 Methodology

In estimating medical costs, we followed the procedure used by Rice et al. (1990). To estimate direct inpatient costs, we obtained hospital charge data for all discharges from Washington hospitals in 1990 for selected diagnoses. We then estimated the charges attributable to drug or alcohol abuse by multiplying the charge figures by the attributable fractions in the same manner as was done to estimate mortality costs. The diagnoses analyzed, along with the attributable fraction values, are shown in Table 6.1.

Indirect hospital costs are comorbidity costs in which alcohol and drug disorders play a secondary role. For example, a patient with a primary diagnosis of heart disease and a secondary diagnosis of alcohol dependence may recover from heart surgery more slowly and thus require a longer hospital stay than would a similar patient without a secondary diagnosis of alcohol dependence.

To estimate indirect hospital costs, we compared average hospital charges (within diagnostic-age-sex categories) for two groups of patients: patients with a secondary or tertiary diagnosis directly linked to alcohol or drug abuse, and patients without such a diagnosis. The difference between the average charges for the two groups of patients provided a measure of the indirect (incremental) costs attributable to substance abuse. Patients hospitalized with a primary diagnosis related to drug or alcohol abuse were excluded to avoid double counting.

The data used to estimate hospital direct and indirect costs were obtained from the Washington Comprehensive Hospital Abstract Recording System (CHARS), which gathers ongoing detailed information on all discharges from Washington hospitals. The attributable fractions were taken from Rice et al. (1990).

We analyzed outpatient (direct) costs, including costs for physician office visits, hospital outpatient services, and emergency room visits, using the same method as used to analyze hospital direct costs. Statewide outpatient data were unavailable, so Medicaid outpatient cost data were used to derive cost estimates, which were then extrapolated to the general population.

Table 6.1
Drug- and Alcohol-Related Hospital Inpatient Direct Costs, Washington, 1990
(\$ in thousands)

	AAF (1)	Adjusted Hospital Discharges (2)		Adjusted Hospital Inpatient Costs (3)		
		Females	Males	Females (\$)	Males (\$)	Total (\$)
Alcoholic psychoses	1	352	829	1,046	2,795	3,841
Alcohol dependence syndrome	1	199	434	424	968	1,392
Alcoholic polyneuropathy	1	3	4	20	14	34
Alcoholic cardiomyopathy	1	2	17	10	147	157
Alcoholic gastritis	1	58	119	144	377	521
Alcoholic fatty liver	1	1	3	5	15	20
Acute alcoholic hepatitis	1	73	111	673	842	1,515
Alcoholic cirrhosis of the liver	1	105	260	1,023	2,861	3,884
Alcoholic liver damage, unspecified	1	23	25	141	157	299
Toxic effects of ethyl alcohol	1	37	44	189	137	326
Cancer of the lip, tongue, oral cavity, pharynx	0.47	63	101	611	1,019	1,630
Cancer of the esophagus	0.75	50	92	655	1,260	1,915
Cancer of the stomach	0.2	26	50	323	811	1,134
Cancer of the liver and intrahepatic bile ducts	0.15	13	13	89	138	227
Cancer of the larynx	0.49	16	56	218	801	1,019
Essential hypertension	0.08	21	10	58	32	\$88
Cerebrovascular disease	0.07	418	384	2,974	2,732	5,706
Respiratory tuberculosis	0.25	8	13	65	101	166
Diabetes mellitus	0.05	105	1101	592	596	1,188
Pneumonia and influenza	0.05	331	346	2,056	2,141	4,197
Diseases of esophagus, stomach, duodenum	0.1	63	347	2,093	2,189	4,282
Cirrhosis without mention of alcohol	0.5	58	51	767	835	1,602
Acute pancreatitis	0.41	317	353	2,636	3,632	6,267
Chronic pancreatitis	0.67	93	84	537	491	1,028
Total Alcohol-related Discharges and Costs		2,435	4,487	\$17,348	\$25,091	\$42,439

Table 6.1 (continued)

	DAF (1)	Adjusted Hospital Discharges (2)		Adjusted Hospital Inpatient Costs (3)		
		Females	Males	Females (\$)	Males (\$)	Total (\$)
Drug psychoses	1	274	266	911	869	1,780
Drug dependence	1	665	894	2,824	3,998	6,822
Nondependent abuse of drugs	1	45	47	209	163	372
Narcotics affecting fetus or newborn via placenta or breast	1	1	0	128	0	128
Drug withdrawal syndrome in newborn	1	2	4	3	17	20
Poisoning by opiates and related narcotics	1	61	66	240	797	1,038
Poisoning by sedatives and hypnotics	1	71	38	267	184	451
Poisoning by central nervous system muscle tone depressants	1	32	24	76	85	161
Poisoning by psychotropic agents	1	726	329	2,729	1,257	3,986
Poisoning by central nervous system stimulants	1	9	3	45	28	73
Total Drug-related Discharges and Costs		1886	1671	\$7,432	\$7,399	\$14,831
Total Drug and Alcohol-related Discharges and Costs		4321	16,407	\$24,780	\$9,908	\$57,270

Notes:

- (1) AAF and DAF refer to alcohol and drug attributable fractions, respectively.
- (2) Adjusted hospital discharges are the total number of discharges multiplied by the corresponding attributable fraction.
- (3) Adjusted hospital costs are the total costs multiplied by the corresponding attributable fraction.

Source: Washington Comprehensive Hospital Abstract Reporting System (CHARS), 1990 data tape.

We were unable to obtain hospital cost data for diagnoses related to accidents, which have special codes. To obtain an estimate of medical costs related to automobile accidents involving alcohol, we used national data to derive cost estimates and extrapolated these estimates to Washington.

A more detailed discussion of the methodology used to estimate medical costs is provided in Appendix C at the end of the report.

6.2 Results

Hospital Inpatient Direct Costs:

There were approximately 46,000 discharges from Washington hospitals in 1990 for the 34 diagnostic categories analyzed. Of these 46,000 discharges, 10,100 (22%) represented patients hospitalized for a disease or illness related to alcohol or drug use (Table 6.1).

The cost incurred treating these patients was \$57.1 million. Females accounted for \$24.7 million (43%), males for \$32.4 million (57%). Approximately 75% of the total cost was for treatment of problems related to alcohol abuse. The most costly diagnoses were: drug dependence, acute pancreatitis, cerebrovascular disease, alcohol cirrhosis of the liver, and alcoholic psychoses.

Indirect Hospital Costs:

During 1990, there were 81,407 hospital discharges of patients with a secondary or tertiary diagnostic code linked to alcohol or drugs. These discharges represented approximately 17.5% of all discharges from Washington hospitals in 1990. Indirect costs incurred in treating patients totaled \$49.2 million and are shown in Table 6.2.

Not all indirect costs were positive, mental disorders and circulatory/respiratory diseases had negative indirect costs. In other words, for these two diagnostic areas it cost less, on average, to treat an individual with a secondary drug and alcohol problem than to treat an individual without such a problem. However, for all other diagnostic categories, the indirect costs were positive and often large in

magnitude. For example, on average, the cost of treating patients with digestive system problems having a secondary diagnosis linked to alcohol or drugs was \$1,287 higher than the cost of treating other patients (\$7,619 versus \$6,332 per admission). The finding of negative indirect costs, especially the large negative costs for circulatory/respiratory disease, is surprising. We have no ready explanation for it, but we might speculate on two reasons. One, persons with serious circulatory/respiratory diseases who also have a substance abuse-related secondary or tertiary diagnosis may be more likely to die in the hospital. If so, the average length of stay of these patients would be shorter, and hence the cost of hospital care would be less. Alternatively, patients at the other end of the severity continuum who are not very ill and who may have a substance abuse problem may be more likely to be hospitalized for short stays. The physician may decide such patients lack needed social support at home. Without having detailed data on patient severity, it is impossible to analyze the validity of these two explanations.

Table 6.2
Indirect Cost of Hospitalization by Major Diagnosis
Washington, 1990
(\$ in thousands)

Major Diagnostic Category	Number of Discharges	Costs (\$)		
		Females	Males	Total
Infections & Parasitic Diseases	2,117	1,075	1,897	2,972
Neoplasms	4,368	1,189	4,017	5,206
Metabolic, Immunity Diseases	6,875	2,912	2,339	5,251
Mental Disorders & Diseases of CNS	5,074	-899	387	-512
Circulatory, Respiratory System	24,096	-2,589	-9,407	-11,997
Digestive System	11,627	6,195	8,772	14,967
Pregnancy, Childbirth, Genitourinary System	4,663	2,212	920	3,132
Muscular, Skeletal Systems; Perinatal	11,456	954	738	1,692
Injury & Poisonings	3,687	1,674	4,584	6,258
Injury & Poisonings	3,531	1,726	1,663	3,388
Problems Affecting Health not Involving Disease or Injury	7,913	10,810	8,057	18,867
Total	85,407	\$25,259	\$23,967	\$49,226

Source: Washington Comprehensive Hospital Abstract Recording System (CHARS), 1990 data tape.

Outpatient Costs:

Medicaid outpatient costs related to drug or alcohol use in 1990 for the diagnoses analyzed were \$5.2 million. Extrapolating this figure to the general population, yielded an estimate of \$58.3 million for outpatient costs related to alcohol and drug abuse (Tables 6.3 and 6.4). The diagnostic categories with the highest costs were drug dependence (\$22.3 million), alcohol dependence (\$11.5 million), alcohol psychoses (\$4.3 million) and diseases of the esophagus, stomach, and duodenum (\$2.5 million).

Table 6.3
Alcohol-Related Hospital Outpatient Direct Costs
Washington, 1990
(\$ in thousands)

Alcohol-Related Diagnosis	AAF (1)	Outpatient Direct Costs (\$)
Alcoholic psychoses	1	4,288
Alcohol dependence syndrome	1	11,507
Alcohol abuse	1	176
Alcoholic polyneuropathy	1	10
Alcoholic cardiomyopathy	1	5
Alcoholic gastritis	1	370
Alcoholic fatty liver	1	6
Acute alcoholic hepatitis	1	242
Alcoholic cirrhosis of the liver	1	526
Alcoholic liver damage, unspecified	1	145
Fetal Alcohol Syndrome	1	166
Excessive blood level of alcohol	1	7
Toxic effects of ethyl alcohol	1	348
Cancer of the lip, tongue, oral cavity, pharynx	0.47	1,277
Cancer of the esophagus	0.75	577
Cancer of the stomach	0.2	191
Cancer of the liver and intrahepatic bile ducts	0.15	64
Cancer of the larynx	0.49	607
Essential hypertension	0.08	1,031
Cerebrovascular disease	0.07	978
Respiratory tuberculosis	0.25	472
Diabetes mellitus	0.05	1,178
Pneumonia and influenza	0.05	980
Diseases of esophagus, stomach, duodenum	0.1	2,515
Cirrhosis without mention of alcohol	0.5	658
Acute pancreatitis	0.41	744
Total Alcohol-Related Costs		\$29,065

Note: 1) AAF is alcohol attributable fraction.

Source: 1990 Medicaid Data Tape, State Medicaid Data Office.

Table 6.4
Drug-Related Hospital Outpatient Direct Costs, Washington, 1990
(\$ in thousands)

Drug-Related Diagnosis	DAF (1)	Outpatient Direct Costs (\$)
Drug psychoses	1	2,087
Drug dependence	1	22,317
Nondependent abuse of drugs	1	993
Polyneuropathy due to drugs	1	1
Narcotics affecting fetus or newborn via placenta or breast	1	40
Drug withdrawal syndrome in newborn	1	279
Poisoning by opiates and related narcotics	1	371
Poisoning by sedatives and hypnotics	1	392
Poisoning by central nervous system muscle tone depressants	1	209
Poisoning by psychotropic agents	1	2,456
Poisoning by central nervous system stimulants	1	56
Total Drug-Related Costs		\$29,201

Note: 1) DAF is drug attributable fraction.

Source: 1990 Medicaid Data Tape, State Medicaid Office.

Medical Costs for Auto Accidents Involving Alcohol:

Based on national data, we estimated the cost of providing care in Washington in 1990 for individuals involved in auto accidents involving alcohol was \$51.2 million. On a national basis, medical expenses of victims of motor vehicle accidents in 1990 were estimated to be \$5.2 billion, or \$20.91 on a per capita basis. Extrapolating this cost figure to Washington, yields an estimate of \$100.37 million in total medical costs. The attributable fraction for motor vehicle accidents, taken from Rice et al. (1990), is .51. Multiplying \$100.37 million by .51 yields an estimate of alcohol-related costs for Washington of \$51.2 million.

6.3 Summary

Drug and alcohol abuse leads to illness and injury that often requires medical treatment. Almost 1 in every 5 persons discharged from a Washington hospital in 1990 had a secondary or tertiary diagnosis linked to drug or alcohol abuse. The total estimated cost of medical care provided for the treatment of conditions linked to drug or alcohol abuse was \$216 million. While it was not possible to separate alcohol-related from other drug-related costs in all circumstances, it appears that at least 60% to 65% of the medical care costs are related to alcohol abuse.

CHAPTER 7

SPECIFIC DISEASES

Three diseases that are closely associated with drug or alcohol abuse are acquired immune deficiency syndrome (AIDS), hepatitis B (HBV), and fetal alcohol syndrome (FAS). Unlike other alcohol- and drug-related diseases and illnesses, these three diseases result in long-term medical and social costs. For example, an AIDS patient is about 60% less productive at work due to the illness, and he or she requires frequent medical attention (Scitovsky and Rice, 1987). Additional costs are incurred by county, state, and national agencies that track AIDS and develop interventions to educate high risk groups.

Because of the special nature of AIDS, HBV, and FAS and because of their close association with drug and alcohol abuse, the cost estimates for these areas are presented separately in this chapter. A detailed discussion of the methodology used to derive the estimates is incorporated in Appendix D at the end of the report.

The major findings of the analysis were:

- Total costs for AIDS and hepatitis B associated with injection drug use and for FAS were estimated at approximately \$30.7 million.
- Of these costs, AIDS accounted for \$19.4 million, hepatitis B for \$3.5 million, and FAS for \$7.8 million.
- AIDS contracted through injection drug use accounted for 24 deaths, hepatitis B 6 deaths, and FAS 1 death.

AIDS and HBV, while once thought to be endemic to only a few sub-groups, are blood-borne communicable diseases that can be transmitted to anyone who comes in contact with the viruses. AIDS and HBV are readily spread among injection drug users who share needles. Injection drug users can then transmit these diseases to non-drug users through sexual activities. This chapter estimates the costs of AIDS and HBV associated with injection drug use. Individuals who contracted AIDS from injection drug users through sexual

practices are not included in these estimates because there is no reliable method of determining the number of such individuals.

FAS is a perinatal condition that is caused by maternal use of alcohol during pregnancy. FAS is uncommon, with a rate of about 1.3 per 1000 births (Hansen et al. 1978), yet it impairs the infant with learning disabilities and physiological impairments for the rest of his or her life. FAS-afflicted adolescents and young people are often physically violent, more likely to become alcohol abusers later in life, and require frequent medical attention.

7.1 AIDS and HIV Associated with Injection Drug Use

The link between drug use and AIDS is well documented: in 22% of reported AIDS cases nationwide during 1990, the primary risk category was injection drug use (Washington State and King County Department of Health, 1990). In addition to this direct relationship between drugs and AIDS, drug and alcohol use or abuse is a contributing factor in the onset of AIDS in that it can impair judgment leading to unsafe sexual practices (Plant 1990, Flavin & Frances 1987, MacGregor 1988). Further, the immunotoxic properties of drugs and alcohol can expedite the transition from human immunodeficiency virus (HIV disease) to the more life threatening condition of AIDS (Pillai et al. 1991).

While not requiring the frequent and involved treatment of AIDS, HIV disease demands significant outpatient care, counseling and diagnostic testing. The first three stages of HIV disease are not reportable conditions in Washington, so only estimates exist as to the number of HIV seropositive cases.

During 1990 in the State of Washington, 39 (7.0%) of the 574 people diagnosed with AIDS were in the injection drug user risk category. Males accounted for 30 cases and females accounted for 9 cases (Tyree 1992). There were 201 diagnosed cases of HIV IV (HINA) in Washington during 1990, of which 16 (8%) were injection drug users; males accounted for 10 diagnosed cases and females accounted for 6 (Tyree 1992). The Centers for Disease Control (CDC) (1990) estimated that the average number of people alive with AIDS and HINA in any given year is 2.02 times the number of people diagnosed with AIDS and HINA. Thus, we estimated that there were 81 males and 30 females alive in

Washington during 1990 with injection drug use-related AIDS and HIV IV. Based on national data, we estimated that the number of HIV positive individuals was approximately 8,500 (see Appendix D).

The annual cost of providing medical services (i.e. hospital services, physician inpatient and outpatient services, drugs, and outpatient ancillary services) for AIDS patients in Washington in 1990 was estimated to be \$29,919, based on research conducted by Hellinger (1991). For persons with HIV, annual medical costs were assumed to be \$4,918, based on Hellinger's (1991) estimates. Multiplying these costs by the number of injection drug users with AIDS and HIV yielded an estimate of approximately \$5.6 million in personal medical costs.

Non-personal medical costs (i.e. testing/counseling, patient care/support services, administration) were also estimated, based on the Intergovernmental AIDS Report (1991). We estimated non-personal medical costs incurred in caring and supporting injection drug user AIDS patients at \$286,000.

Indirect costs of injection drug use-related AIDS and HIV include mortality (premature death) and morbidity (lost productivity). Mortality estimates for injection drug use-related AIDS were based on 1990 data from the state death records provided by the Washington State Department of Health, Center for Health Statistics. A total of 339 people died from AIDS, with males accounting for 322 and females accounting for 17. We estimated that there were approximately 24 deaths related to injection drug use. By following the same methodology as outlined in Chapter 4, we estimated mortality costs to be approximately \$11.8 million.

Morbidity costs of AIDS and HIV disease, representing reduced productivity as measured by earnings, were estimated to be approximately \$1.7 million, based on the methodology described in Chapter 3. Appendix D outlines the methodology used to estimate these morbidity costs. Table 7.1 presents the costs estimates for HIV and AIDS.

* Mortality cost estimates for AIDS are included in the overall mortality cost estimates in Chapter 4.

Table 7.1
Cost of Acquired Immune Deficiency Syndrome (AIDS) Associated with
Injected Drug Use, Washington, 1990
(\$ in thousands)

Type of Cost		Male (\$)	Female (\$)	Total (\$)
Direct		4,316	1,619	5,935
	Medical	4,108	1,540	5,648
	Nonpersonal	208	78	286
Indirect		11,158	2,287	13,445
	Mortality*	9,853	1,927	11,779
	Morbidity	1,306	360	1,666
Total		\$15,475	\$3,906	\$19,380

Note: Mortality estimate is based on a 4% discount rate. See Chapter 4 for formula.

Sources:

- 1) CHARS and Medicaid data from Washington State for 1990 (1992)
- 2) Intergovernmental AIDS Report for 1990 (1992), based on costs from Testing/ Counseling, Patient Care/ Support Services, and Administration.

7.2 Hepatitis B (HBV)

Hepatitis B (HBV) is an infectious disease that is most often transmitted by injection drug use, heterosexual contact with an infected person or multiple partners, and homosexual activity. National surveillance indicates that 28% of all HBV cases are related to injection drug use (Morbidity and Mortality Weekly Report, [39] 1990). As with AIDS, we did not estimate indirect costs associated with transmission of HBV from injection drug users to non-injection drug users through sexual activity.

On a national basis, 2%-7% of the population is infected with HBV. Most of those infected are carriers, passing on the virus, with little sickness themselves. Generally 3% of the infected population will require hospitalization for acute HBV, but only a fraction die (Morbidity and Mortality Weekly Report, [39] 1990).

Applying these estimates to Washington for 1990, HBV infected persons would represent between 95,000 and 330,000. However, in Washington during 1990, the Department of Health recorded only 616 acute cases of hepatitis B

(Washington State Department of Health, 1992). We assumed that the remaining HBV infected individuals were only carriers, transmitting the disease to others but not developing acute symptoms requiring medical care.

We multiplied the number of reported cases (616) by .28 (the injection drug use-HBV risk coefficient discussed earlier) to obtain an estimate of the number of HBV cases related to injection drug use. Approximately 172 cases were injection drug use-related, of which males accounted for 97 (56.5%) and females accounted for 75 (43.5%). We estimated the total costs for medical expenses (i.e. hospital services, physician inpatient and outpatient services, drugs, and outpatient ancillary services) at \$226,235 (Table 7.2). (See technical appendix for further explanations.)

Indirect costs associated with injection drug use-related HBV include mortality (premature death) and morbidity costs (lost productivity). A total of 23 people died from HBV in Washington in 1990; males accounted for 15 deaths, females for 8 (Washington State Department of Health Statistics, 1992). Based on the .28 HBV attributable risk coefficient, we estimated that 4 males and 2 females died from injection drug use-related HBV. Using a 4% discount rate and following the methodology described in Chapter 4, we estimated the cost due to premature deaths of persons with injection drug use-related HBV to be \$1.9 million (Table 7.2).

Table 7.2
Cost of Hepatitis B (HBV) Associated with Injected Drug Use,
Washington, 1990
(\$ in thousands)

Type of Costs	Male (\$)	Female (\$)	Total (\$)
Direct	128	98	226
Indirect	2,319	925	3,244
Mortality*	1,540	378	1,917
Morbidity	779	548	1,327
Total	\$2,446	\$1,024	\$3,470

Note: * Mortality cost estimates are based on 4% discount rate. See Chapter 4 for formula.

Source: CHARS and Medicaid data from Washington State for 1990 (1992)

Morbidity costs, or lost productivity from injection drug use-related HBV, were based on a general impairment rate of .37 calculated by Luft (1975). The methodology used to estimate morbidity costs was adapted from Chapter 3 and is detailed in the technical appendix. Total morbidity costs were estimated to be \$1.3 million (see Table 7.2).

7.3 Fetal Alcohol Syndrome

Exposing a fetus to alcohol may result in irrevocable damage, which can be physical, mental or both. The most severe form of alcohol damage to the fetus is fetal alcohol syndrome (FAS). The diagnosis of FAS is often based on three criteria (Abel and Sokol, 1987; Weeks, 1989):

- 1) Pre and/or post natal growth retardation; weight, length, and/or head circumference below the tenth percentile.
- 2) Central nervous system problems; neurological abnormality, developmental delay, or intellectual impairment.
- 3) Characteristic facial features, including small eyes, crossed eyes, short nose, or abnormalities of the mouth such as cleft palate.

Other problems associated with FAS include heart defects (e.g. tetralogy of fallot), hearing loss (e.g., sensorineural anomalies), visual defects (e.g., strabismus and myopia), dental defects and mental retardation (the average IQ for an individual with FAS is 66).

Determining the number of persons living with FAS is difficult. Many babies with FAS do not exhibit characteristic behaviors and growth abnormalities until age two or three, making diagnosis and surveillance more complicated. Of the 79,187 live births in Washington during 1990, we estimated that 103 had FAS, based on the conservative FAS incidence rate of 1.3 per 1000 births (Washington State Vital Statistics 1990, Hansen et al. 1978). (See technical appendix.)

The most widely reported cost associated with FAS is that of intensive care for newborns. Many infants require intensive hospitalization and rehospitalization. Generally more medical complications are incurred with lower weight babies. It is estimated that three-fourths of all FAS babies are of low birthweight. Therefore during 1990, 77 infants (75.2% of 103 FAS babies born) were assumed to be born with low birthweight attributable to FAS. Based on hospital charges, the total cost for the 39 infants requiring intensive care was \$3,889,860 (Table 7.3). It was estimated that rehospitalization cost of low birthweight FAS infants was \$143,635 in 1990.

Table 7.3
Cost of Fetal Alcohol Syndrome (FAS), Washington, 1990
(\$ in thousands)

Complications	Costs (\$)
Medical*	1,267
First year rehospitalization	144
Mental retardation	2,095
Neonatal care	3,890
Neonatal physician care	432
Total	\$7,827

Note: * Medical includes initial audio screening, audio check-up, otitis media surgery, hearing aid, hearing aid mold, heart surgery, cleft palate surgery (see Weeks, M. 1989).

Sources: Abel and Sokol (1987), Weeks, M. (1989), Washington State Vital Statistics (1990)

In addition to the costs associated with birth, there are large lifetime medical costs. Based on a FAS study conducted in Alaska (Weeks 1989), we estimated lifetime medical costs for FAS babies born in 1990. Common ailments include audio screening, audio check up, hearing surgery, heart surgery, and cleft palate surgery. The total costs associated with these specific birth defects was approximately \$1.3 million (Table 7.3). In addition to the costs incurred for treating physical problems, there are also expenses incurred in caring for individuals with serious mental problems or developmental disabilities. Such individuals can require help ranging from special education to lifelong institutionalization. The estimated cost of providing residential care for all FAS

individuals in Washington in 1990 was approximately \$2.1 million, based on national data (see technical appendix). This does not include treatment costs for non-institutionalized individuals. Table 7.3 presents the total costs of FAS by category.

7.4 Summary

Cost estimates for AIDS and HBV associated with injected drug use totaled approximately \$22.9 million. In both cases, calculations were made significantly easier by using accurate state and national surveillance data. Unfortunately, similar data were not available for estimating FAS costs. This is due, in part, to the complex nature of this condition and its relatively recent discovery in 1973. Despite data limitations, we were able to derive estimates of FAS costs for Washington, which were estimated to be \$7.8 million.

As this chapter indicates, injection drug use is a major risk factor for both AIDS and HBV. This does not only threaten the lives of those using drugs, but by unsafe sexual practices injection drug users are placing many more non-drug users at risk. Women appear to be especially vulnerable to contracting AIDS through injection drug use. While AIDS is more common among males, the percentage of females acquiring the disease by injection drug use is substantially higher.

This chapter included cost estimates of FAS. While FAS has garnered considerable attention, it represents only one type of perinatal substance exposure. Serious problems related to other types of exposure include fetal alcohol effects (FAE), which is more common than FAS, and crack cocaine addicted babies. We did not attempt to estimate costs for either FAE or crack-addicted infants. However, the costs of these two problems are believed to be substantial.

CHAPTER 8

OTHER RELATED COSTS

In addition to the costs analyzed in the previous chapters, there are three other types of costs that need to be considered: social welfare administration, fire destruction, and nonmedical costs of motor vehicle accidents, including legal and court costs. The methodology used to estimate these costs was similar to that used to estimate other costs; that is, attributable risk coefficients, taken from Rice et al. (1990), were applied to cost data obtained from secondary sources to generate estimates of costs related to drug and alcohol abuse.

The major findings of the analysis were:

- An estimated \$3.5 million was spent on social welfare administration in Washington during 1990 related to drug and alcohol abuse.
- Alcohol is related in 60% of the fires that are started by smoking, causing approximately \$14 million in damage.
- There were 372 fatal motor vehicle accidents and 8,667 non-fatal accidents associated with drug and alcohol abuse. When combined with property damage, the total costs of motor vehicle accidents was approximately \$97 million.
- Other related costs were 6.37% of the total economic cost of alcohol and drug abuse.

8.1 Social Welfare Administration

Social welfare programs serve individuals with drug or alcohol problems (Cruze et al. 1981); therefore, a portion of the cost of administering these programs should be included in the calculation of economic costs related to substance abuse. However, it is appropriate to include only administrative costs, since welfare payments themselves are considered transfer payments, which normally are not defined as true economic costs since these payments involve only redistribution of income.

Washington administrative expenditures data for the following welfare programs were obtained from various sources (see Table 8.1): Old Age, Survivors, and Disability Insurance (OASDI); Public Assistance; Food Stamps; Supplemental Security Income (SSI); and Veteran's Pensions and Rehabilitation. Two additional welfare programs for which data were unavailable were, the Railroad Temporary Disability Insurance and the State Temporary Disability programs.

It was estimated that \$3.5 million was spent on social welfare administration in 1990 in Washington related to drug and alcohol abuse. Veteran's Pensions and Rehabilitation comprised the largest portion of this cost, estimated to be approximately \$2 million.

Table 8.1
Administrative Costs of Social Welfare Programs, Washington, 1990
(\$ in thousands)

Program	Total Admin. Costs (\$)	Percent Due to		Percent Drug Abuse (%) [4]	Alcohol Admin. Costs (\$)	Drug Admin. Costs (\$)	Total Alcohol and Drug Admin. Costs (\$)
		Alcohol Abuse (%) [4]	Drug Abuse (%) [4]				
OASDI [1]	28,000	2.60	0.30		728	84	812
Public Assistance [2]	125,145	0.50	----		626		626
Food Stamps [2]	1,609	0.50	----		8		8
Alcohol / Substance Abuse [3]	100	50.00	50.00		50	50	100
Supplemental Security Income [1]	1,092	1.90	----		21		21
Veterans Pensions & Rehabilitation [3]	17,462	10.20	1.10		1,781	192	1,973
Total	\$173,408				\$3,214	\$326	\$3,540

Sources:

- 1) Personal communications with Dan Farrell, Regional Public Affairs, Social Security, estimate based on national administrative costs.
- 2) Personal communication Corki Hirsch, Department of Social and Health Services, Olympia, WA.
- 3) *Governor's Proposed Supporting Data and 1991-1993 Operating Budget.*
- 4) Rice et al. 1990.

8.2 Fire Destruction

In an early economic study of alcohol abuse, Berry and Boland (1977) estimated that 7.1% of the cost of property damage and destruction due to fire could be attributed to alcohol abuse. Based on Berry and Boland's research, we used this figure to estimate the cost of alcohol-related fire destruction in Washington.

Information on the cost of property damage and destruction due to fire in Washington in 1990 was provided by the Washington Surveying and Rating Bureau, an advisory rating organization for property casualty insurance companies. Fire losses were broken down into four categories (Table 8.2).

Table 8.2
Cost of Property Damage and Destruction Due to Fire
Washington 1990
(\$ in thousands)

Type of Insurance	Total Losses (\$)	Losses Due to Fire (\$)	Percent Due to Alcohol (%)	Total Alcohol Losses (\$)
Fire Alone	27,926	27,926	7.1	1,983
Home Owners	255,342	102,137	7.1	7,252
Farm Owners	19,153	7,661	7.1	544
Commercial / Multiple Peril	84,867	61,006	7.1	4,331
Total	\$487,288	\$198,730		\$14,110

Source: Personal communication, A. Anshell, Washington Surveying and Rating Bureau, 1992

Three categories of insurance shown in the table, Home Owners, Farm Owners, and Commercial/Multiple Peril, include losses due to causes other than fire. Administrative staff of the Washington Surveying and Rating Bureau estimated that 40% of total Home Owners losses, 40% of Farm Owners losses, and 33% of Commercial/Multiple Peril losses were due to fire. The loss data for these three categories were adjusted accordingly. As Table 8.2 shows, Washington sustained in 1990 \$14 million in property damage and destruction due to fires whose cause was attributable to alcohol abuse. Losses by home owners accounted for half the total cost.

8.3 Motor Vehicle Accidents

Use or abuse of alcohol or drugs is often a factor in motor vehicle accidents. In addition to medical costs resulting from injuries (described in Chapter 6), motor vehicle accidents result in other costs, including legal/court costs, accident investigation and vehicle damage costs, and costs related to insurance administration.

The source of cost data on accidents was an early study by Faigin (1976), who estimated costs for several types of accidents, including fatal accidents, accidents involving property damage only, and accidents with injuries. We updated the cost figures reported in that study to 1990, and obtained data on the numbers of accidents involving alcohol in Washington from a report titled *Traffic Collisions in Washington State* (1991).

The estimated cost per accident used for the analysis is shown below:

	Fatal Accidents	Non-Fatal Accidents	Property Damage Only
Number of accidents	372	8,667	6,959
Legal/Court	\$6,259	\$2,169	\$20
Insurance Administration	\$711	\$519	\$71
Accident Investigation	\$234	\$152	\$18
Vehicle Damage	\$9,698	\$6,966	\$766

Based on the above information, we estimated the total cost of alcohol-related auto accidents in Washington in 1990 to be \$97.4 million (Table 8.3). These costs were distributed as follows: \$6.3 million (6.3%) for 372 fatal accidents; \$85.0 million for 8,667 non-fatal injury accidents; and \$6.1 million for 6,959 accidents involving property damage only. The largest single component of accident costs was vehicle damage, which accounted for \$69.3 of the \$97.4 million, followed by legal and court costs (\$21.3 million).

Table 8.3
Nonmedical Costs Associated with Motor Vehicle Accidents
Washington, 1990
(\$ in thousands)

	Fatal Accidents (\$)	Non-Fatal Accidents (\$)	Property Damage Only (\$)	Total Costs (\$)
Legal/Court	2,328	18,799	139	21,266
Insurance	264	4,498	494	5,257
Administration				
Accident	87	1,317	125	1,530
Investigation				
Vehicle Damage	3,608	60,374	5,331	69,313
Total Costs	\$6,288	\$84,989	\$6,089	\$97,365

Note: Numbers may not add up due to rounding.

Sources:

1) Faigin (1976)

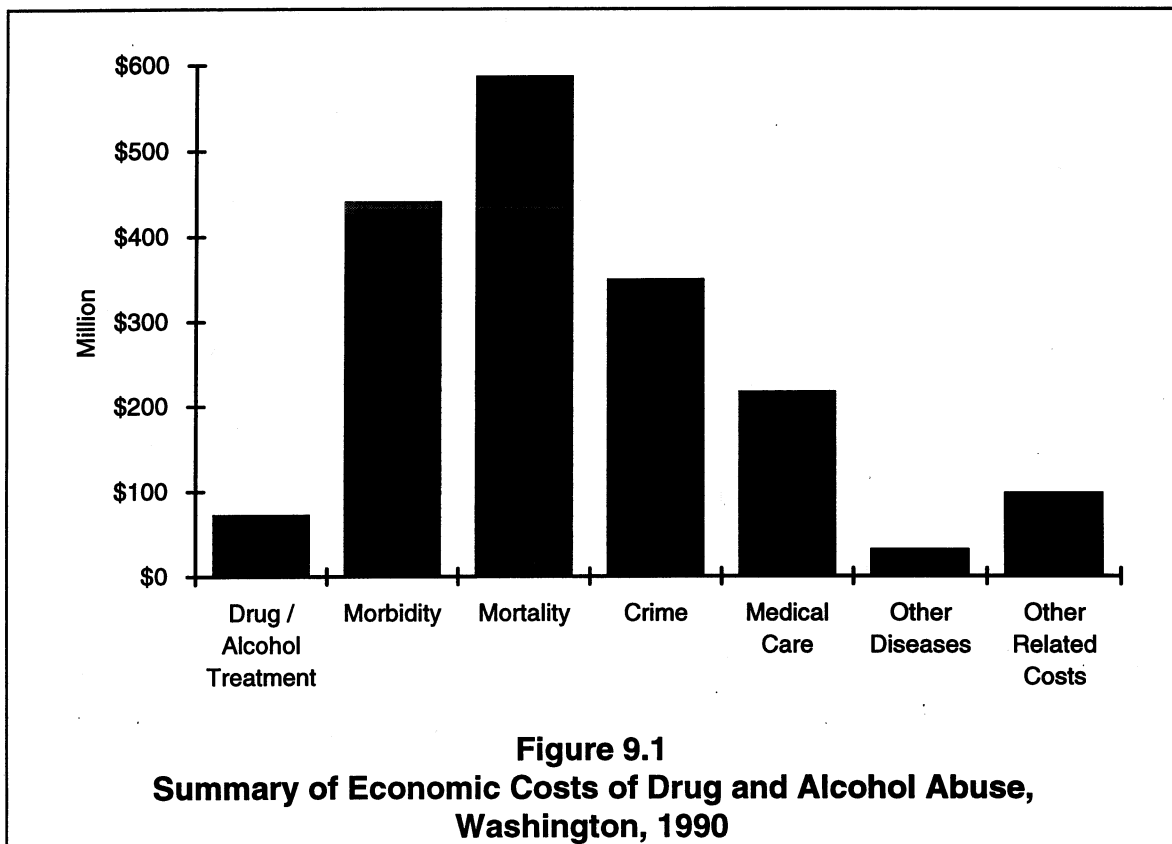
2) *Traffic Collisions in Washington State*, 1991

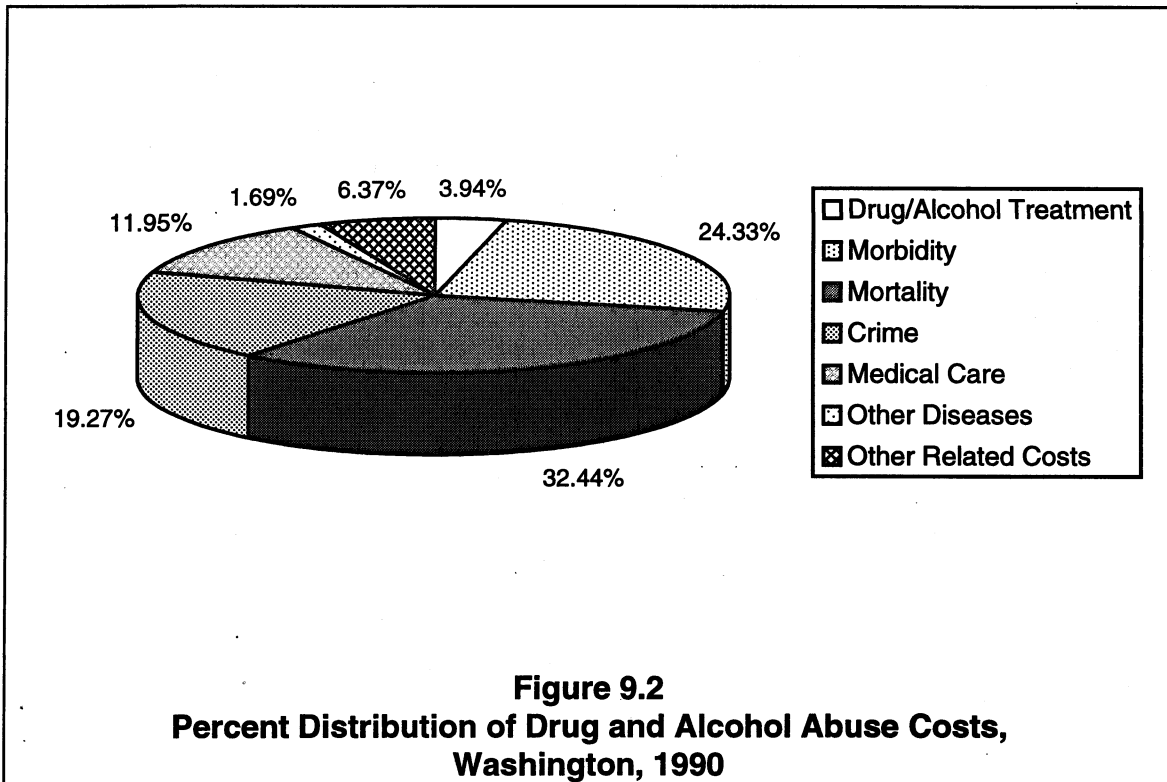
CHAPTER 9

SUMMARY AND IMPLICATIONS

9.1 Summary of Findings

The total economic cost of drug and alcohol abuse in Washington for 1990 was estimated to be \$1.81 billion. Figure 9.1 summarizes these costs among the seven areas analyzed and discussed in the previous chapters. As shown, the largest single cost category was mortality, which accounted for \$586 million, or 32% of the total cost. The next largest cost category was morbidity (\$439.5 million), followed by crime (\$348 million), and medical care (\$215.9 million). The percentage distribution of costs is shown in Figure 9.2.

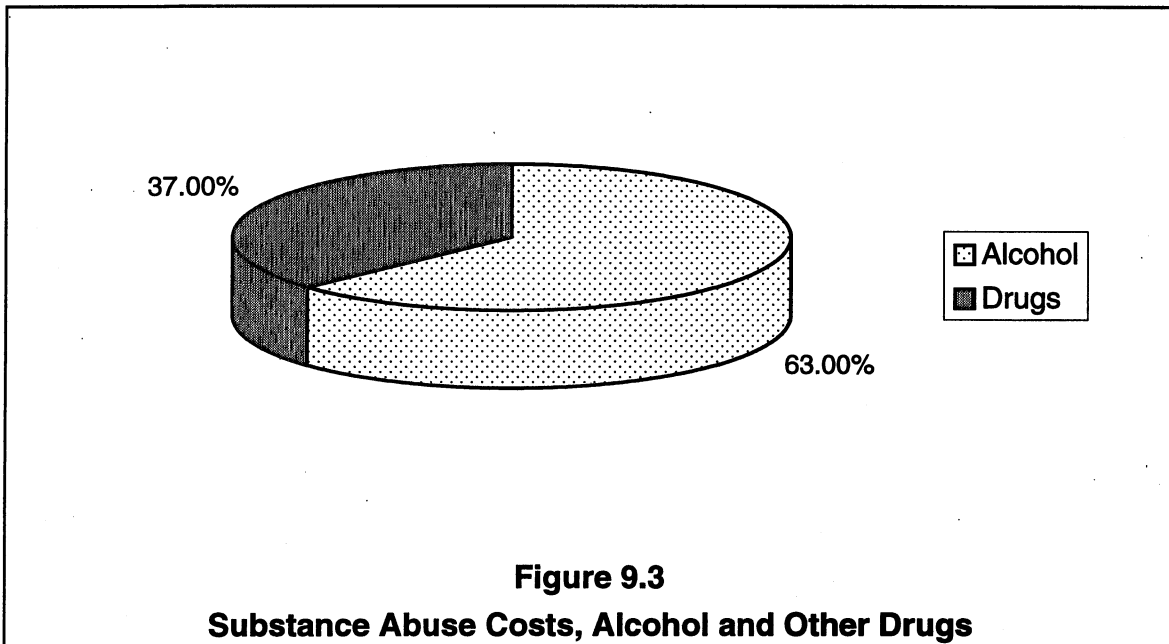




How much of the economic cost of substance abuse is attributable to drug abuse versus alcohol abuse is a question with obvious policy and program implications. It was not possible to separate drug and alcohol costs with any precision for two of the seven areas analyzed: treatment and medical care. The five areas where these costs could be separated accounted for \$1.26 billion. Figure 9.3 shows the distribution of costs between drugs and alcohol. As shown, almost two-thirds (63%) of the costs were related to alcohol abuse. One area where drug-related costs were higher, by a large margin, was crime.

Indirect costs represent lost productivity due to morbidity, mortality, and crime. While Figure 9.1 does not show a breakdown of crime costs, the indirect costs for this area (described in Chapter 5) would include productivity losses due to incarceration and victimization, which account for approximately \$60 million. When added to morbidity and mortality costs, this yields a total indirect cost figure of \$1.09 billion, or approximately 60% of the \$1.81 billion total estimated cost of drug and alcohol abuse in Washington. As this indicates, economic loss

associated with lost productivity due to alcohol and drug abuse is very significant.



Beyond the very large economic loss associated with drug and alcohol abuse, it was noted that during 1990 in Washington 2,155 persons died of causes related to drug or alcohol abuse. These deaths resulted in a loss of over 56,000 years of potential life. As noted in Chapter 6, almost 1 in every 5 patients (18%) discharged from a Washington hospital in 1990 had a secondary or tertiary diagnosis directly related to drug or alcohol abuse. While drug and alcohol abuse is often viewed as a problem affecting a limited number of individuals, this report indicates otherwise. It is clear that in Washington drug and alcohol abuse affect many persons from all social strata.

How do the costs reported here for Washington compare with those reported elsewhere? Strict comparisons are difficult to make among different studies because of differences in methods, definitions, and data. Some comparisons can be made with caution, however. In a study conducted in Texas, Liu (1992) estimated that the total economic cost of substance abuse for 1989 was \$12.6 billion. In order to compare costs, it is necessary to adjust for differences in population size; that is, it is necessary to calculate per capita costs. The 1989

per capita cost in Texas was \$759. In contrast, the 1990 Washington cost was \$382.

The large difference in costs for Washington and Texas reflects the conservative approach we took in estimating Washington costs. For example, we chose not to include crime career costs in our analysis because of the high degree of uncertainty surrounding estimation of these costs, but Liu did so for her Texas study. She estimated crime career costs in Texas to be \$1.08 billion, or approximately 9% of total economic costs. This to us seems tenuous. Further, as discussed in Appendix A, Liu's approach to calculating morbidity costs yielded estimates we believe were too high. Had we followed the same methodology our morbidity cost estimates above would have been approximately \$1.3 billion instead of \$440 million. This would have increased per capita costs in Washington from \$382 to approximately \$810, which is actually higher than Texas' cost of \$759. Thus, all of the cost difference between Washington and Texas can be attributed to differences in estimation methodology.

9.2 Implications

A number of implications follow from the information presented in this report. Considering these in detail is beyond the scope of this report, and could easily form the basis of an entire separate report. We close with a brief discussion of some of the implications that seem important to us and worth further consideration.

1. Our analysis, like the analyses of Rice et al. and Liu, has shown that most of the economic cost of substance abuse is related to alcohol, not drugs. While drug abuse is a serious social problem whose consequences result in large costs, especially for crime, alcohol abuse has more significant consequences that result in economic losses. In many quarters, there continues to be the perception that the "drug problem" is limited to a relatively small segment of the population who use illicit substances. While efforts must continue to find improved methods of preventing drug abuse and of providing treatment for individuals with drug problems, there needs to be greater recognition of the serious consequences of alcohol abuse and the large economic loss Washington

suffers because of it. Further, in terms of deaths and loss of potential years of life, it is alcohol, not drugs, that exacts the most significant toll. In Washington in 1990, there were 1,931 alcohol-related deaths as compared to 224 drug-related deaths. Alcohol-related deaths resulted in 48,692 years of potential life lost, while drug-related deaths resulted in 7,590 years of potential life lost.

2. Developing effective strategies to address the problem of substance abuse in Washington will continue to present major challenges. This report suggests that greater effort should be focused on alcohol abuse. In this regard, we offer several comments for consideration.

As this report indicates, alcohol-related motor vehicle accidents result in significant economic costs and loss of life. There are a number of approaches involving regulatory action as well as public education campaigns that might be taken to reduce the impact in this area. One would be to reduce the legal blood alcohol level used to define drunk driving. Some states and countries abroad have done this and have successfully reduced injuries and deaths from motor vehicle accidents. Another strategy is to use deferred prosecution of individuals convicted of DWI offenses to motivate these individuals to obtain needed treatment for alcohol abuse. A recent study by Baxter, Salzberg and Kleyn (1992) of deferred prosecution in Washington showed this to be an effective approach to reducing DWI offenses.

In addition, it may be appropriate to consider the question of whether Washington's taxes on alcohol are adequate given the cost estimates presented here. Data indicate that in 1990 net tax revenue from all sales of alcohol in Washington was approximately \$115 million. In contrast, our analysis suggests that economic costs incurred in Washington from alcohol alone were on the order of \$750 million, not including medical care costs (for which drug and alcohol costs could not be separated). Thus, for every \$1 that Washington State collects in tax revenue from alcohol sales, over \$7 is spent as a result of alcohol abuse.

Research has shown that people's consumption of alcohol is generally sensitive to price (Phelps, 1987). This is especially true for young people who consume alcohol. Increasing taxes on alcohol may have the effect of both increasing

revenue and reducing alcohol consumption. Consideration should be given to earmarking some of the alcohol tax revenue to develop new alcohol and drug treatment programs, or expand current programs.

A combination of new regulatory approaches and expanded prevention and treatment activities may be needed to increase our collective ability to deal with the problem of drug and alcohol abuse more effectively.

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Appendix A

Calculation of Mortality Costs

Morbidity costs are an estimate of diminished on- and off-the-job productivity due to alcohol and drug use or dependence. As defined by Rice et al. (1990), morbidity is a core indirect cost: indirect costs represent resources (available labor power) unused or underused (as opposed to resources expended as in the case of direct costs); core costs represent the lowered output of individuals with alcohol or drug disorders, not of their relatives, other caregivers, or of others affected by the consequences of their disorder.

Methodology

Calculations

The measurement of morbidity costs for this analysis was based on the human capital concept, whereby the value of productivity is assumed to be a function of earnings, and lost output is equated with decreased income.¹ In addition, lost income resulting from alcohol and drug disorders is based on estimates of impairment rates and the number of individuals with an alcohol or drug disorder (i.e., prevalence). Impairment rates are estimated and defined by Rice et al. (1990) as the adjusted cross-sectional regression on alcohol and drug abuse prevalence rates of life time earnings measures. Thus, multiplying the impairment rate by the average income yields the average annual income lost per individual with either an alcohol or drug disorder. In simplified terms, total losses are determined by multiplying the prevalence by the average income lost per individual, disaggregated by age, sex, and disorder.

The algebraic formula used by Rice et al. (1990) is given below:

$$\$Loss = \sum \sum \sum (POP_{ij} * PREV_{ijk})(b_{ijk} * Y_{ij})$$

¹ For the morbidity analyses, income is defined as wage earnings plus housekeeping rates.

Where

$\$LOSS$ is the aggregate loss in income due to alcohol and drug disorders.

POP_{ij} is the size of the population by age and sex.

$PREV_{ijk}$ is the prevalence rate by age, sex and disorder.

b_{ijk} is the percentage income loss per individual with a disorder by, age, sex, and disorder.

Y_{ij} is the average income by age and sex for individuals without disorders.

i,j,k index age, sex and disorder, respectively.

Sub-populations

To generate reliable estimates, the above cost model must be applied to separate sub-populations. Four commonly used sub-populations are:

- 1) *civilian, non-institutionalized*;
- 2) *non-institutional group quarters*, including persons in homes for the mentally retarded, halfway houses, religious group houses, military workers, and college dormitories;
- 3) *institutionalized*, including psychiatric hospitals, hospitals for the mentally retarded and juvenile institutions; and
- 4) *transient*, including the homeless and migrant worker populations.

The cost calculations in this report were based on two groups: the Washington civilian, non-institutional population and the transient population. These groups had a combined population of approximately 3.44 million persons aged 16 years and older. Table 3.1 presents the age and sex breakdown used for the analysis. Separating the two populations would generate more accurate estimates, but

since the Washington Bureau of the Census does not provide detailed transient data, this was not possible. The non-institutional group quarters and the institutionalized populations, which comprise approximately 120,000 persons (2.5% of the state population), were excluded from this study because of incomplete data on income, prevalence, and labor force participation rates.

Omitting these sub-groups from the analysis should not affect the results to any significant degree since the groups account for only a small fraction of the state's total population. However, this omission makes our cost estimates more conservative than they otherwise would be.

Substance Disorders in the Civilian, Non-institutionalized Population

Prevalence

Prevalence is a key component of the morbidity cost estimation model used for the analysis. Unfortunately, it is difficult to estimate accurately. This is, in part, due to the movement of individuals in and out of the substance abusing population. Definitional issues complicate the matter further. There are three ways prevalence can be measured. First, it can be defined as the number of persons satisfying clinical diagnoses, such as the Diagnostic and Statistical Manual of Mental Disorders (DSM III-R and proposed DSM IV). Second, it can be defined as the number of individuals exhibiting certain behaviors caused by either alcohol or drug abuse. Third, it can be measured as the number of individuals who ingest a minimal amount of alcohol or drugs over a specified period of time.

We obtained alcohol prevalence estimates from two sources. For persons aged 16-17, figures were taken from the Statewide Report on Substance Use Among Public School Students in Washington (Koss-Warner, 1989). The percentage of tenth grade students indicating "high use" varied from 22% for boys to 12% for girls. (For comparison, when the same students were asked about binge drinking, defined as having five or more drinks at once, the prevalence figures increased to 25% and 15% for boys and girls, respectively.) For persons 18 years and older, the Behavioral Risk Factor Survey (BRFS), a statewide random sample survey sponsored by the State Health Department in collaboration with the Centers for Disease Control, was used to provide prevalence data on drinking. We used the estimates from the 1989 Washington State BRFS for the

Labor Force Participation

Decreased wage earnings and housekeeping values comprise the morbidity losses for individuals with an alcohol or drug disorder in the labor force. To obtain the total population of working abusers, the labor force participation rate (LFPR) was multiplied by the total number of individuals with a substance disorder (Table 3.2). According to the Washington State Annual Demographics Information report (ADI), men 16 and over had a total LFPR of 79.6% in 1990, while women had a rate of 60.4% (Washington Labor Market and Economic Analysis, 1990). Table 3.2 details the LFPR by age and sex. The largest group of working abusers with alcohol problems was individuals aged 35-44 for both males and females. This group represents 49,150 males and 5,366 females. Among drug abusers, the largest age group was 25-34 for males and females, totaling 22,715 and 10,970, respectively.

Impairment Rates and Losses per Capita

Impairment rates represent the loss of productive capacity due to an alcohol or drug disorder. For example, a 35 year old woman with a drug disorder (impairment rate of 1.8%) is believed to be approximately 2% less efficient than a similar woman without a disorder. Therefore, the morbidity loss would be calculated as 1.8% of the woman's annual earnings (assuming she works) and housekeeping value. Rice et al. (1990) calculated impairment rates by statistically regressing income on various demographic characteristics and measures of substance abuse. Average losses per abuser were calculated by multiplying average annual incomes for each age and sex group by the corresponding impairment rate. Average income is the sum of wage earnings and imputed housekeeping value. Housekeeping accounts for the value of housework productivity not included in earnings, at the market value for comparable service. Cost figures representing 1985 US housekeeping were taken from Rice et al. (1990) and adjusted to reflect 1990 price levels. In addition, since the average working wage in Washington was 97.9% of the national average, the data were deflated by 2.1% to represent Washington housekeeping values (Office of Financial Management, 1991). Table 3.3 presents the earnings, housekeeping values, and total income by age and sex. In addition, Table 3.3 includes a breakdown of impairment rates for each age

item on the survey related to chronic drinking, defined as 2 or more drinks per day. Chronic drinking was highest among the 18-24 and 55-64 age groups (see Table 3.1).

Drug prevalence rates from three sources were used for the analysis. For persons aged 16-17 the Koss-Warner (1989) report was used. The percentage of tenth graders who reported a "high use" of drugs varied slightly between girls and boys (6% and 7% respectively). For persons age 18 and over, data on drug abuse in Washington was not available, so national prevalence data were used. The NIMH-sponsored Epidemiological Catchment Area Surveys (ECA) provided prevalence data for age groups 18-54. Prevalence estimates for persons aged 55 and over were obtained from data gathered by the NIAAA. Unfortunately, the NIAAA reports only cocaine use (Grant, 1992). Both of these surveys used clinical diagnoses from the DSM to determine prevalence.

Table 3.1 presents the prevalence figures used for the analyses by age, sex, and type of disorder. In addition, Table 3.1 summarizes the total number of Washington residents with the indicated disorder by sex and age for persons 16 and above.

Errors in prevalence can significantly affect morbidity costs. For this reason, two additional estimates incorporating different prevalence figures are provided for comparison with the cost estimates presented here. The first estimate uses both alcohol and drug data from the NIMH-sponsored Epidemiological Catchment Area Community Survey (ECA). The second uses alcohol data from the NIAAA in combination with drug data from the ECA. The differences in total morbidity costs are presented later in this appendix.

and sex group. Multiplying the earnings and housekeeping values by impairment rates yields the per capita loss estimates.

Losses from Individuals not in the Labor Force

Even if a person is not in the labor force (i.e. has no earnings), he or she can still experience a loss in housekeeping productivity from a substance disorder. In such cases, a non-working individual with a substance disorder is less efficient at maintaining a household. The non-labor force (NLF) participation rate is 100 minus the LFPR figures presented in Table 3.2. In other words, subtracting the population of working abusers from the total population of abusers provides an estimate of the population of abusers not in the labor force. The same impairment rates in Table 3.3 are valid for the NLF subgroup.

Multiplying the impairment rate by the housekeeping values for age and sex groups generates an estimate of the NLF per capita losses. With more available time to maintain the household, the housekeeping rates are higher for NLF participants. Thus, multiplying the NLF by the per capita losses gives the total non-labor force morbidity costs for persons not in the labor force.

Sensitivity of Results to Model Parameters

Costs incurred from individuals in the labor force are computed by multiplying the per capita losses for each working individual by the number of workers with substance disorders. These costs are added to the non-labor force economic losses to yield total morbidity losses (Table 3.4).

The morbidity cost estimates presented in this chapter depend upon parameter values used in the cost estimation model. For example, changes in prevalence or impairment rates would change the cost estimates. Lower prevalence rates would result in fewer people with alcohol and drug disorders and corresponding lower productivity losses. The sensitivity of the results can be assessed by re-estimating the model with different parameter values. This was done for two different sets of prevalence rates, one higher the other lower than the ones used for the analysis. Using NIAAA's lower estimates of alcohol prevalence yields a total morbidity cost estimate of approximately \$322 million. The second

estimate, based on ECA data that reflect higher prevalence rates, yields a higher estimate of total morbidity costs: \$745 million. The difference in these two estimates demonstrates the sensitivity of the estimation procedure to the prevalence rates.

Changes in impairment rates would also have a significant effect on the cost estimates. For example, a 10% reduction across the board in impairment rates would result in a proportional 10% drop in total morbidity costs. The impairment rates used for this analysis were generated from national data (Rice et al. 1990). Therefore, our analysis implicitly assumes that Washington's impairment rates, if calculated, would be similar to those of the nation as a whole. This assumption does not seem unreasonable.

Lastly, how substance abuse is defined and measured has a significant effect on the estimation of morbidity costs. For example, Liu's (1992) Texas study included a third substance-abuse disorder group, labeled poly. Persons in this poly group were assumed to abuse both alcohol and drugs, while not having a primary drug of abuse. The poly group was not included in this report for fear that individuals would be counted twice, artificially inflating the cost estimates.

In addition, Liu (1992) calculated impairment rates for Texas that were higher than the national rates generated by Rice et al. (1990), which were used for this report. Overall, the inclusion of this poly category and state-specific impairment rates dramatically increased Texas' total estimated losses. We computed a morbidity cost estimate for Washington based on the approach used by Texas, i.e., we incorporated Texas' poly-group prevalence and higher impairment rates into the analysis but did not change other components of the model. These changes increased the estimate of morbidity costs for Washington from \$440 million to \$1.3 billion—a figure we believe is too high.

Appendix B

Calculation of Mortality Costs

Mortality costs are an estimate of the current value of lost future earnings¹ from individuals who die prematurely from alcohol and drug disorders. In general, such deaths affect societal growth by diminishing the non-institutionalized civilian population's ability to contribute through investments, consumption, and productivity.

Mortality costs were estimated by multiplying the number of deaths in Washington in 1990 by the discounted value of future earnings for each age and sex cohort. Lifetime earnings were based on the formula presented at the end of this appendix. In simple terms, the formula imputes average earnings for each age and sex group by accounting for labor force participation rates (LFPR) and age adjusted survival rates from the Monthly Vital Statistics Report. Imputed earnings are then annually compounded for each remaining year of life expectancy.

Alcohol and Drug Deaths

Although alcohol or drug use is directly related to many deaths, it usually plays a secondary or exacerbating role. This presents problems when calculating the number of people who die each year from substance abuse. Rice et al. (1990), Ravenholt (1984), and Roizen (1985) have estimated alcohol and drug attributable fractions (AAFs and DAFs). AAFs and DAFs are proportions that are multiplied by the total number deaths within a given age-sex-diagnostic category to generate an estimate of the number of deaths attributable to substance abuse. When the cause of death is directly related to alcohol or drugs, the AAF or DAF is equal to 1 (i.e., substance abuse is 100% responsible for the death). However, when alcohol and drugs are only partially responsible (e.g. suicide, homicide, or cancer of the liver) the AAF and DAF is a proportion of 1. For example, according to research (Max, Rice and MacKenzie, 1990), alcohol is

¹ Earnings, as used in this chapter, refers to wage earnings, housekeeping values and social insurance.

involved in almost half of the homicides throughout the U.S. (i.e. AAF is .46). In Washington in 1990, there were 247 homicides; multiplying this number by the AAF yields an estimate of 114 homicides assumed to be attributable to alcohol use. Tables 4.2 and 4.3 present the number of deaths for males and females for selected diagnoses and the corresponding AAF and DAF values. The AAF and DAF figures used to estimate alcohol- and drug-related deaths were taken from Rice et al. (1990).

Death records served as the source of information for the mortality data analyzed for this report. Cause of death is classified according to the International Classification of Diseases (ICD-9) codes and listed on each state death record (State of Washington Center for Health Statistics, 1990). For example, deaths resulting from alcoholic cirrhosis of the liver are coded 571.2; similarly, drug psychoses are coded 292.0.

Earnings

Output losses due to premature death are based on wage earnings, housekeeping values, and social insurance from 1990 data. Housekeeping accounts for the value of housework productivity not included in earnings, at the market value for comparable services. Housekeeping estimates were taken from Rice et al. (1990) and were adjusted to reflect both 1990 prices (Rice's 1985 figures were increased by 1.209 to reflect 1990 prices) and differential wage earnings in Washington (the average working wage in Washington is 97.9% of the national average, requiring Rice's figures to be deflated by 2.1 % (Office of Financial Management, 1991). Social insurance contribution payments were calculated as 7.5% of wage earnings.

Imputed earnings were calculated by multiplying the labor force participation rates (LFPR) by the wage earnings for each age-sex group. Added to this were the average housekeeping values. The higher imputed earnings for males reflected the differences in the LFPR and wage earnings (see Table 3.3). Thus, in Washington in 1990, a male aged 25 could expect imputed earnings of approximately \$22,930, while a female aged 25 could expect \$11,995. Table B-1 presents imputed annual earnings and LFPR by age and sex.

Table B-1
Earnings, Labor Force Participation Rate (LFPR), and Lifetime Earnings,
Washington, 1990

Age	Imputed earnings	LFPR	Discount Rate	
			Lifetime Earnings 4%	Lifetime Earnings 6%
<u>Male</u>				
<1			\$390,293	\$189,526
1-18	\$5,222[1]	60.00%[1]	\$507,924	\$292,772
19-24	\$8,907	87.50%	\$688,693	\$490,761
25-34	\$22,930	97.20%	\$700,462	\$539,223
35-44	\$32,216	97.50%	\$593,533	\$491,733
45-54	\$33,044	93.80%	\$382,245	\$335,946
55-64	\$21,542	69.10%	\$161,035	\$148,448
65+	\$5,838	16.80%	\$35,042	\$33,484
<u>Female</u>				
<1			\$217,400	\$108,981
1-18	\$5,893[1]	57.00% [1]	\$282,923	\$168,349
19-24	\$8,828	75.80%	\$358,178	\$256,078
25-34	\$11,995	76.70%	\$347,279	\$262,255
35-44	\$14,220	79.40%	\$300,296	\$241,496
45-54	\$14,361	72.60%	\$221,381	\$189,317
55-64	\$13,637	45.70%	\$118,925	\$108,115
65+	\$5,612	8.00%	\$33,685	\$32,188

Notes: [1] Earnings and LFPR start at age 16.

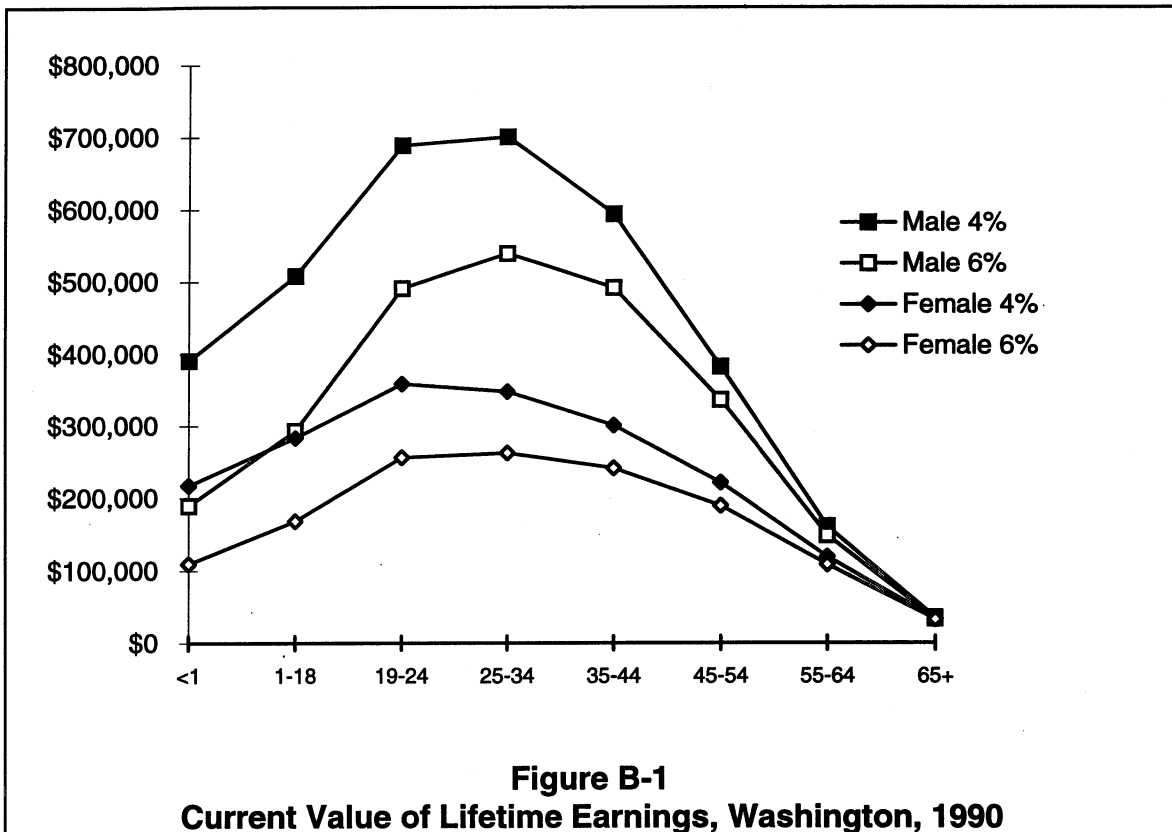
Sources: Bureau of the Census (1991), Money Incomes of Household, Families and Persons in the United States: 1990

Mortality cost estimates are sensitive to future changes in both wage earnings and the LFPR. The mortality cost estimation model we used assumed a 1% annual increase in productivity but did not adjust for annual changes in the LFPR. The Washington Labor Market and Economic Analysis (1990) has predicted that by the year 2010 the total LFPR for females will grow by 4.6%, while the male LFPR will decrease by 2.7%. If these LFPR changes occur, they will alter the present value of future earnings for males and females.

Unfortunately, no cost estimation model has been constructed to compensate for such changes.

Discount Rates and Lifetime Earnings

The present value of lifetime earnings is the sum of the average person's earnings for each future year of life expectancy, discounted to reflect current dollar amounts. In simpler terms, this is the total amount that the average individual will earn over his or her remaining life valued in 1990 dollars. This report presents lifetime earning estimates calculated using two discount rates of 4% and 6%. This difference in discount rates shows how sensitive the lifetime earnings cost estimation model is. The mortality cost estimates, however, were calculated based only on a 4% discount rate. Figure 4.2 displays the present value of future earnings for males and females by age cohort based on 4% and 6% discount rates.



Years of Potential Life Lost (YPLL) and Cost per Death

YPLL was estimated by using age and gender specific life expectancies for the United States multiplied by the number of deaths by diagnosis. Then by summing the YPLL for all diagnoses, we generated estimates of the total years of potential life lost. In Washington during 1990, there were 2,155 deaths attributable to alcohol and drugs, which translated into 56,282 years of potential life lost.

Cost per death was calculated by dividing the total mortality cost by the total number of alcohol and drug attributed deaths for age-sex cohorts. The cost per death provides a means for comparing average mortality costs per state, yet it reflects differences in average male and female earnings. For example, in a similar report for Texas, Liu (1992), calculated that the per death cost was approximately \$286,803. Rice et al. (1990) in a national study reported a per death cost of \$311,442. (Both of these comparisons were adjusted to 1990 Washington dollar amounts.) Our estimates are slightly lower, but this difference could be accounted for by a different distribution of ages for those individuals who died.

The formula used to calculate the present value of lifetime earnings is given on the following page.

Formula For Calculating The Current Value Of Lifetime Earnings

MORTALITY

$$V = \sum_{n=a}^{85+} \frac{(X_n W_n P_a^n + H_n K_n P_a^n)}{(1+i)^{n-a}}$$

Where:

- a is the midyear age for the given cohort of persons
- X_n is the annual mean earnings for all persons with earnings in an age group where the midpoint is age n
- i is the discount rate
- H_n is the annual mean imputed value of housekeeping services for all persons in an age group where t (he midpoint is age n
- K_n is the average housekeeping participation rate in the age group with the midpoint age n
- $W_n P_a^n$ is defined as the number of labor force years per person in an age group as determined as follows:

$$W_n P_a^n = \frac{\sum_{j=t}^{t+r-1} L_j W_j}{L_a}$$

Where:

- j is the specific single year of age under consideration
- t is the beginning year of the age group
- r is the number of years in this age group; in any age group j can go from t to $t+r-1$

- L_j is the number of individuals surviving to j out of a cohort of 100,000 live births
- W_j is the single year labor force participation rate
- L_a is the number of persons living out of a cohort of 100,000 live births
- P_a^n is the appropriate probability that an individual age a survives to age n ,
- W_n is the average labor force participation rate in the age group with the midyear n , resulting from the single year labor force participation rate W

Appendix C

Calculation of Medical Care Costs

Estimates were made for two types of hospital inpatient costs: direct costs and indirect costs. When a patient is hospitalized for an illness or injury that can be attributed, either wholly or partly, to drug or alcohol abuse, the costs incurred are direct costs. Examples of this would include patients hospitalized for cirrhosis of the liver caused by excessive consumption of alcohol as well as patients hospitalized for stomach cancer. In the former example, 100% of the hospitalizations would be attributable to alcohol, whereas in the latter example only a portion of the hospitalizations, hence costs, would be attributable to alcohol.

To estimate direct drug- and alcohol-related hospital costs, we obtained attributable fractions from Rice et al. (1990) and applied these fractions to CHARS data. The diagnoses analyzed, along with attributable fractions are shown in Table 6.1.

Indirect costs are comorbidity costs in which alcohol and drug disorders play a secondary role. Research indicates that the average length of stay of individuals with alcohol and drug disorders is greater than that of individuals without these disorders (NIAAA, 1989; Teplin et al. 1989).

To estimate indirect costs, we compared average charges (within diagnostic-age-sex categories) for patients with and without a secondary or tertiary diagnosis directly linked to alcohol or drug abuse (i.e., diagnoses which had an attributable fraction of 1). The difference between the hospital charge for the two groups is the marginal cost of hospitalization attributable to substance abuse. This marginal cost figure was multiplied by the number of patients with a secondary or tertiary diagnosis related to alcohol to generate estimates of the total indirect (comorbidity) cost. Patients with a primary diagnosis related to drug or alcohol abuse were excluded to avoid double counting.

The data used to estimate direct and indirect hospital costs was obtained from the Washington Comprehensive Hospital Abstract Recording System (CHARS),

which provides diagnostic and charge data on all patients discharged from Washington hospitals.

To estimate outpatient (direct) costs we relied on Medicaid cost data. Outpatient costs included, but were not limited to, physician office visits, hospital outpatient clinic treatment, emergency room visits, and outpatient diagnostic care. The diagnostic categories and attributable fractions used for the analysis were taken from Rice et al. (1990). Per capita costs for the Medicaid population (approximately 441,000) were calculated, then extrapolated to the general population (approximately 4.8 million).

This method of estimating outpatient costs for the general population makes three implicit assumptions. First, it assumes that the level of utilization of outpatient services in the Medicaid population is similar to the general population. Second, it assumes that the amount paid by Medicaid to health care providers is close to the economic cost of providing the services. Third, it assumes the level of alcohol and drug abuse in the Medicaid population is reflective of the general population.

It is unclear whether the level of utilization of outpatient services in Washington by the Medicaid population is greater, the same, or less than that of the general population. There are access barriers for Medicaid patients that do not exist for many privately insured patients. For example, many Medicaid patients do not have a regular source of care, which may reduce utilization. On the other hand, the general health status of Medicaid patients may be worse than privately insured patients, leading to higher utilization. Thus, it is unclear how utilization of outpatient services in the Medicaid population would differ from utilization in the general population.

The second issue is whether the amount paid by Medicaid represents the economic cost of treatment. The economic cost of treatment is the value of the resources expended to provide care. There are two measures of costs that could be used: provider charges or Medicaid payments. The former overstates the true economic cost of treatment, while the latter understates it. We chose the more conservative measure of Medicaid payments, recognizing that this underestimates the actual costs of outpatient care.

Medical costs associated with motor vehicle accidents involving alcohol were estimated by extrapolating national cost estimates to Washington. This was done because CHARS data on accidents, which are coded differently from other diagnoses, were not provided. Using national data to make cost estimates for Washington produces figures that are unavoidably subject to error, and this should be kept in mind when interpreting the cost estimates for motor vehicle accident.

AIDS morbidity cost estimates were based on an impairment rate of .6 (Scitovsky and Rice, 1987). In other words, a person with AIDS is believed to be 60% less efficient at the workplace. It was assumed that a person with HIV was more productive than a person with AIDS, yet not as productive as a healthy worker. Luft (1975) found that the average disabled male aged 18 to 64 suffers a 37% reduction in annual earnings. Although this impairment rate was not calculated specifically for HIV, we used it to estimate morbidity costs because it was the only reasonable figure available.

Hepatitis B

Although there may be as many as 95,000 to 300,000 persons infected each year in Washington with hepatitis B (HBV), only 616 cases were reported by the Washington State Department of Health. While this number seems far too low and may reflect underreporting, we preferred to take a conservative approach and use it anyway. To estimate the number of injection drug use-related HBV cases, we multiplied the 616 acute cases by .28, consistent with data showing 28% of all HBV cases are attributable to injection drug use (Morbidity and Mortality Weekly Report, [39], 1990).

Based on a review of Washington State Medicaid data, we assumed that 92% of all infected individuals used outpatient services, and 8% used inpatient services (the ratio in the Medicaid population). Data on hospital inpatient treatment costs for HBV patients were obtained from the Washington Comprehensive Hospital Abstracts Recording System (CHARS). We used Medicaid cost data to derive estimates of outpatient treatment costs assumed to be received by non-Medicaid HBV infected persons. Using these two sources of data, we estimated total medical costs for treating injection drug use-related HBV patients at \$226,235.

Indirect costs of injection drug use-related HBV consist of mortality and morbidity costs. Morbidity costs, or lost productivity, from injection drug use-related HBV were based on a general impairment rate of .37 calculated by Luft (1975). Lui (1992) used this figure to calculate injection drug use-related HBV costs for Texas. Unfortunately, researchers have not determined impairment rates specifically for HBV. Applying Luft's impairment rate to earnings data for age-

sex cohorts enabled us to generate morbidity cost estimates for injection drug use-related HBV (see Chapter 3).

Fetal Alcohol Syndrome (FAS)

FAS prevalence rates were estimated by Sokol et al. (1987) in two studies, the first conducted from 1973-1979, the second from 1979-1982. The latter study was conducted on low-income, inner-city residents in Cleveland. The first study estimated a FAS incidence rate of 0.4 per 1000 live births; the second study estimated a rate of 3.0 per 1000 live births. One widely used incidence figure is 1.9, which was developed from an analysis of all reported studies in the literature from FAS' initial diagnosis in 1973 until 1986 (Abel and Sokol 1987).

For this study we used a more conservative figure of 1.3, which was reported by Hanson et al. (1978) from a study conducted in Seattle in the early 1970s. We believe the local orientation of this study provides a more accurate estimate of the true Washington FAS incidence rate. This rate yielded an estimate of 103 FAS babies born in Washington during 1990.

It is believed that 75.2% of FAS babies are of low birthweight (Abel and Sokol 1987). Therefore during 1990, 77 infants (75.2% of 103) were assumed to be born with low birthweight attributable to FAS. Of these, 74.3% were medium low birthweight (MLBW), and 25.7% were very low birthweight (VLBW) (Abel and Sokol 1987). Generally more medical complications are incurred with lower weight babies. It is estimated that 32.8% of the MLBW and all of the VLBW infants required intensive care hospitalization. The average cost of hospitalization per infant has been estimated at \$99,740, with physician care accounting for an additional \$11,065 (Weeks 1989). Using these figures, we estimated the cost for the 39 infants requiring intensive care to be \$3,889,860. In addition, low birthweight babies often require rehospitalization. It is estimated that 19% of MLBW and 38.3% of VLBW infants require rehospitalization in their first year (Abel and Sokol 1987). The estimated cost of this was \$144,000.

Lifetime medical expenses are additional costs of caring for individuals with FAS. Abel and Sokol (1987) estimated the national cost of providing 24 hour residential care to be \$109,800,789. Assuming the per capita cost in Washington State is similar to the national average, the estimated cost of providing residential care for all FAS individuals in Washington in 1990 would be \$2.1 million.

Appendix D

Calculation of Costs for Specific Diseases

AIDS

Included in the cost estimates associated with injection drug use-related AIDS are cases of Class IV non-AIDS (HINA), a reportable condition in Washington. HINA is characterized by the presence of secondary infections which do not fit the Center for Disease Control's (CDC) definition of AIDS. While not meeting all the CDC's definitional requirements for AIDS, HINA demands many, if not all, of the same medical treatments as AIDS. In Washington during 1990, it was estimated that of the 574 people diagnosed with AIDS, 39 (7%) were in the injection drug user risk category (Tyree 1992). In addition, there were 201 diagnosed cases of HINA, of which 16 (8%) were injection drug users (Tyree 1992).

Based on national data, it is believed that through 1990 there were between 10,000 and 20,000 people diagnosed as HIV positive in Washington (Tyree 1992). The low end of this estimate was used for this report. Cumulative deaths through 1990 and all diagnosed cases of AIDS and HINA were deducted from the 10,000 to prevent overcounting. It was assumed that the risk category percentages for AIDS and HIV were the same.

To obtain an estimate of the number of persons with AIDS whose deaths could be attributed to injection drug use, we assumed the proportion of those who died was the same as the proportion of those who acquired AIDS from injection drug use. Hellinger (1991) calculated that for a person with either AIDS or HIV IV annual personal medical costs were approximately \$32,000. Thus, deflating this by 6.5% to account for inflation and cost differentials between Washington and the nation overall yielded a figure of \$29,919, which was used as the estimate for annual medical treatment costs for Washington in 1990 (Office of Financial Management, 1991). Hellinger (1991) estimated that annual non-personal medical costs were \$5,150, or \$4,919 adjusting for inflation and cost differentials. Overall, personal medical expenses were estimated to be \$5.6 million.